

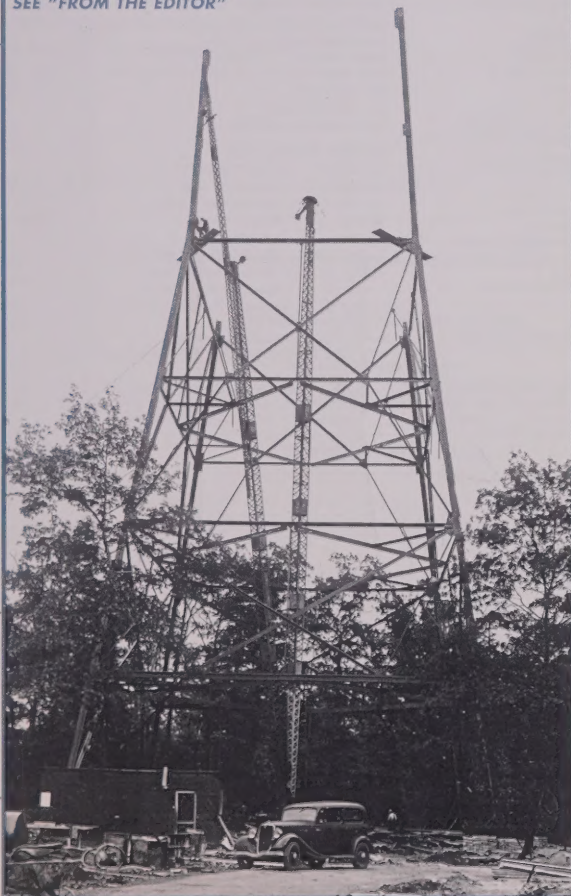
The OTB

THE OLD TIMER'S BULLETIN MAY 2003 VOL. 44 / #2

OFFICIAL JOURNAL OF
THE ANTIQUE WIRELESS
ASSOCIATION, INC.

*Published for the collector,
historian and old-time
radio operator*

**ARMSTRONG'S EXPERIMENTAL FM
TOWER BEGINS ITS 425-FOOT CLIMB
SEE "FROM THE EDITOR"**



From the Houck Collection (see <http://huwz.cerl.com/oldradio/>). Courtesy Mike Katzdorn

AWA CONFERENCE: AUGUST 20-23, 2003

OUR THEME: FREQUENCY MODULATION



THE OLD TIMER'S BULLETIN

OFFICIAL JOURNAL, ANTIQUE WIRELESS ASSOCIATION, INC.

BRUCE L. KELLEY 1914-1997, FOUNDING EDITOR

OFFICERS

President.....Geoffrey Bourne
1st V.P.....Brian C. Belanger
2nd V.P.....Ron Frisbie
Secretary.....Joyce Peckham
Treasurer.....Randolph W. Haus, KB2PLW

DIRECTORS

Lawrence F. Babcock
Brian C. Belanger
Geoffrey Bourne
Hugh J. Davey
Marc Ellis, N9EWJ
Christian R. Fandt
William Fizette, W2DGB
Ronald Frisbie*
Edward Gable, K2MP*
Randolph W. Haus, KB2PLW
Richard Neidich
Joyce W. Peckham
Lauren A. Peckham*
Allan Pellnat, KX2H*
Thomas Peterson, Jr.*
Bruce D. Roloson
Robert Schaumleffel, WA2IKS

*Also serves on AWA Electronic Communication Board of Trustees

CONFERENCE COMMITTEE

Chairman.....Hugh J. Davey
Programs.....Lauren Peckham
Auctions.....Walt Buffinton & Bruce Roloson
Equipment Contest.....Geoffrey Bourne
Chris Bacon
Registration.....Joyce Peckham
Photos.....Richard Ransley

HONORARY MEMBERS

Anthony Constable
Bro. Patrick Dowd, F.S.C., W2GK
Lauren Peckham
Bruce Roloson
Elliot Sivowitch
Sherwood M. Snyder
William B. Fizette, W2DGB

REGIONAL MEETING REPS

California.....Floyd Paul, W6THU
Canada.....To Be Announced
D.C. Area.....Paul Mooney, K4KRE
Indiana.....Herman Gross
New York.....Ed Gable
Carolinas Chapter.....Ron Lawrence, KC4YOY
Texas.....Chevie Crandell (Dallas)
David Moore (Houston)

WEB SITE: <http://www.antiquewireless.org>

Antique Wireless Association, Inc. is an IRS 501(c)3 charitable organization.

AWARDS ADMINISTRATORS

AWA Houck Awards.....Barney Wooters
Bruce Kelley-OTB Award.....Bob Thomas, W3NE
Equipment Awards.....Geoffrey Bourne
J. Albert Moore Award.....Thomas Peterson, Jr.
Taylor Award.....Pete Yanczer
Tyne Award.....Lauren Peckham

WHOM TO CONTACT

Please write legibly. Enclosing an SASE speeds replies.

DUES AND ADDRESS CHANGES: Joyce Peckham (Secretary), Box E, Breesport, NY 14816, (607) 739-5443; FAX: (607) 796-6230, e-mail: awapeckham@aol.com. Dues: \$20 per year in U.S.; \$25 elsewhere. Life membership: \$400 in U.S.; \$500 elsewhere. Make checks payable to "AWA."

AWA OFFICIAL BUSINESS: Geoffrey Bourne (President), 405 8th Ave., St. Albans, WV 25177-2853, (304) 722-4690, gcbourne@citynet.net.

BUSINESS CARD ADS: Robert W. Perry, W2TIX, "Smoke Signals," 131 E. High St., Painted Post, NY 14870.

OTB SUBMISSIONS: Marc Ellis, Editor, OTB, P.O. Box 1306, Evanston, IL 60204-1306, (847) 869-5016, e-mail: mfellis@enteract.com.

AWA REVIEW SUBMISSIONS: Tom Perera, W1TP, Editor, AWA Review, Box 122, Hancock, VT 05748, e-mail: tom@w1tp.com.

ORDERS FOR THE AWA REVIEW OR BACK ISSUES OF THE OTB; COORDINATION OF SLIDE SHOWS: Edward M. Gable, 187 Lighthouse Rd., Hilton, NY 14468, (585) 392-3088.

WANT ADS: Richard Ransley, P.O. Box 41, Sodas, NY 14551, (315) 483-9307.

ANNUAL CONFERENCE BUSINESS: Hugh J. Davey, 32 Paula Dr., Long Valley, NJ 07853; (908) 850-9086; beagle2@sprynet.com.

FINANCIAL REPORTS: Randolph W. Haus, KB2PLW, P.O. Box 665, 6935 Rte. 227, Trumansburg, NY 14886; (607) 387-5293.

AWA ELECTRONIC COMMUNICATION MUSEUM: Please see "Museum News" column for contact and administration information.

OTB STAFF

Editor
Marc F. Ellis, N9EWJ

Design & Production
Claudia Gray Sweet

Copy Editor
Joseph J. Schroeder, Jr., W9JUV

Web Page Designer
Chuck Schwark

Advertising Mgr.
Robert W. Perry

CONTRIBUTING EDITORS

Amateur Radio
John Rollins, W1FPZ

Below 535
Frank Lotito, K3DZ

Book Reviews
David W. Kraeuter

Breadboarding
Dick Parks

Classified Ads
Richard Ransley

The Communications Receiver
William B. Fizette, W2DGB

Equipment Restoration
D.K. Owens

Key & Telegraph
John Casale, W2NI

Mikes and Men
George A. Freeman

The Museum
Ed Gable, K2MP

Obituaries
Charles Griffen, W1GYR

On the Internet
Chuck Schwark

Radio Reproducers
David Crocker

Television
Richard Brewster

The Vacuum Tube
Ludwell A. Sibley

ANTIQUÉ WIRELESS ASSOCIATION, INC. BOX E, BREESPORT, NEW YORK 14816

The Old Timer's Bulletin is published approximately four times a year by and for members of the Antique Wireless Association, Inc. AWA is a nonprofit historical society founded in 1952 and chartered by the State of New York. The Old Timer's Bulletin is available through AWA membership. Its issuance is subject to change from time to time as to frequency, content, and size. It is not liable in any way for any buying-and-selling transaction entered into as a result of its content.

© 2003 Antique Wireless Association, Inc.

CONTENTS

CONFERENCE PREVIEW

- 18 Rochester Conference 2003 Staff

FEATURE ARTICLES

- 36 The Alexanderson Alternators at Haiku Joseph F. Stephany N2XS
The 16 kHz, 250 kW transmitters could reach submarines anywhere in the world, submerged or not.
- 40 A Collage Of Ideas Transmitter Frank J. Lotito, K3DZ
An easy-to-build, mostly 1940s, crystal-controlled transmitter with a few anachronistic touches.
- 60 Guglielmo Marconi: Creating Wireless Telegraphy Ronald R. Thomas
Patience and persistence turned the experimental results of others into a practical communications tool.
- 64 Did Marconi Receive Transatlantic Radio Signals in 1901?—Part 2 ...Henry M. Bradford
If he did, it might not have been on the wavelength he thought!
- 73 Restoring a Preamp From the Golden Age of Hi-Fi Carlos Fazano
Careful, you might catch the vintage high fidelity bug!

COLUMNS

- 9 Museum News Ed Gable, K2MP/W2AN
- 11 Mics and Men George A. Freeman
The Mic: Western Electric 633 "Saltshaker" The Woman: Kathryn Kuhlman
- 12 AWA News Staff
- 24 Radio Reproducers Dave Crocker
Boudette Manufacturing Co: The Sonochorde Family of Cone Speakers, By Buford Chidester
- 25 Television Richard Brewster
Restoring a British HMV 904: Part 2—The Procedure, By Hugo Holden
- 28 Amateur Radio John Rollins, W1FPZ
Results of the Linc Cundall Memorial OT and 30s Night Contests
- 32 The Communications Receiver William Fizette, W2DGB
The 1945 Hammarlund HQ-129X, By Jim Hanlon, W8KGI
- 34 The Vacuum Tube Ludwell A. Sibley
Tube Salvage Schedules
- 46 On the Internet Chuck Schwark
Radio Monitoring Resources on the Web
- 47 Equipment Restoration Ken Owens
Correcting Long-Ago Repairs
- 48 Key and Telegraph John Casale, W2NI
Horace G. Martin, Part Three: A Vibroplex in Every Telegraph Office
- 50 Recent Radio, TV and Entertainment Obituaries Charles S. Griffen, W1GYR
- 53 A Structured Approach to Fixing Up Those Nice Old Radios William Fizette, W2DGB
Attending to a Family Heirloom: A 1935 Warwick Three-Band Tombstone
- 56 Below 535 Frank J. Lotito, K3DZ
DDH47 Commemorates 100th Anniversary of Marconi's Transatlantic Transmission, By Ray Soifer
- 58 New Books and Literature David W. Kraeuter
- 66 Breadboarding Dick Parks
The Return of the Spherical Audion

DEPARTMENTS

- | | | |
|-------------------------|----------------------|----------------------------|
| 4 President's Message | 62 About Our Authors | 72 Silent Keys |
| 4 Letters to the Editor | 68 Classifieds | 74 Museum Store |
| 5 From the Editor | 71 Business Card Ads | 76 Museum Store Order Form |

THE PRESIDENT'S MESSAGE

Greetings,

I hope you all have had a safe and healthy winter season. By now you should have finished last year's radio projects and have a clean workbench to start this new radio collecting season. One can only hope. It seems that my projects come in faster than I can do them. Oh well.

We have just had our first radio meet of the year, The CC-AWA "Spring Meet in the Carolinas" in Charlotte, NC. It was well attended and the weather cooperated. Ron Lawrence and crew put on a great show every year. This year was no exception. The flea market was just about sold out on Friday and there were some really nice pieces of equipment for sale. The auction and seminars drew a good audience and all were pleased with what they purchased or learned. If you have time next year in March make it to this meet. You will not be disappointed.

The planning for the annual conference in Rochester is well under way. As you know the theme for this year is FM (Frequency Modulation). The dates for the conference are August

20-23, 2003. Plan to be there. Last year there were 818 attendees at the meet and 288 vendors in the flea market. This is one of the largest conferences in the country. You don't want to miss this one.

On an official AWA subject, the AWA logo is now registered with the US Patent and Trademark Office. Congratulations go to Alan Pellnat for all of his hard work in obtaining this registration for the AWA. Rules and guide lines for the use of the logo will be forthcoming.

Well, enough for now. Hope to see you at a radio-meet in the near future. If you have any questions or comments please contact me, but please no calls after 9:30 p.m. if possible.

Geoffrey Bourne
405 8th Avenue
St. Albans, WV 25177
(304)722-4690
GCBourne@CITYNET.NET



LETTERS TO THE EDITOR

All letters to the Editor are read with interest and attention, though not all can be published in this column. Letters may be paraphrased, shortened or otherwise edited to fit the available space. The statements made by our correspondents are their own opinions and do not necessarily reflect the views of either the OTB staff or the Antique Wireless Association.

20s RADIO NEWS

Reader Ray Larson (West Los Angeles, CA) sent along some interesting radio-related clippings from 1920s-era *Scientific Americans*. Items from the June and August, 1922 issues, written on the occasion of the "reconvention of the National Radio Conference," suggest that the radio laws, regulations and licenses adopted by the government in 1912 have become obsolete with the advent of "radiophone broadcasting." It was recommended that the government take a stronger role in radio regulation and, especially, that the National Bureau of Standards determine the bandwidth required for "satisfactory radio telephony." A November, 1927 item notes that the fall sales season shows the beginning of a trend to "the light-socket set which dispenses with all batteries and takes its power from the house-lighting mains."

KDKA DOG HOUSE GOES BACK HOME

KDKA, the world's first radio broadcasting station, went on the air in East Pittsburgh, PA to broadcast the Harding-Cox election returns on November 2, 1920. Ten years later, the transmitter was moved to Saxonburg, PA and, in 1937, a new 718-foot antenna tower was built to improve coverage. A small octagonal "dog house" building at the base of the tower housed a spider web tuning coil.

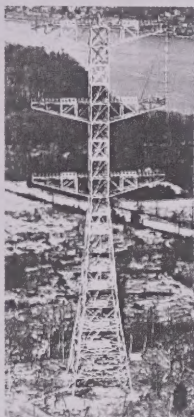
In 1940, when the station moved once again (to Allison Park, PA), the coil moved with it, but the doghouse was acquired by Elvin Sollie and moved to his property for use as a playhouse by his grandchildren. The current property owner, Pamela H. Walters, has donated the historic structure to the Saxonburg Historical and Restoration Commission. Following restoration, it will be placed on permanent exhibit in Roebling Park in

FROM THE EDITOR

Our Cover

Our May cover photograph reflects the theme of the upcoming AWA National Conference, which this year happens to be "Frequency Modulation." It shows the Alpine, New Jersey site of Edwin Armstrong's experimental FM station W2XMN on October 14, 1937. American Bridge Company crews had begun erecting the 425-foot transmitting tower a little over a week before. I'm including, here, a small picture to show the completed tower in 1938. The tower looks much the same today, and many AWA members undoubtedly took note of the fact that major New York FM and TV broadcasters relocated their antennas to it immediately after the 911 disaster.

These two images were found on the remarkable web site of AWA member Mike Katzdorn ([http://](http://www.erols.com/oldradio)



Armstrong FM transmitting tower after completion in 1938. From Houck Collection, courtesy Mike Katzdorn.

www.erols.com/oldradio), featuring images related to Edwin Armstrong from the collection of Harry W. Houck, an AWA Honorary Member who became a Silent Key about 1990.

Harry, who established AWA's Houck awards for Documentation and Preservation, was a long-time associate of Armstrong's and, with an eye to history, saved and preserved a stunning number of artifacts, including many rare images, relating to the inventor's long career. Houck eventually entrusted these items to Katzdorn, who put them into his fascinating and informative web site dedicated to Armstrong and Houck. Visit it via the URL above—or click on the link you'll find on the "Inventors and Pioneers" links page of our web site (www.antiquewireless.org).

(continued on page 8)

Saxonburg. The formal dedication ceremony is scheduled for 2 p.m. on Saturday, June 28, 2003. For more information, call 724-663-5313.

ED COOPER

Washington, PA



The KDKA "doghouse" being removed from the Walters property by members of the Saxonburg Historical and Restoration Commission restoration crew.

FIGETTE RESTORATION BRINGS BACK MEMORIES

I read Bill Fizette's article on restoring the 1938 Emerson BA201 (February, 2003 issue) with interest. Readers might like to review my report on reconstructing the electrically identical Emerson BB209 in the August, 1991 issue. I built this circuit twice. Once as a teen-ager and again about the time of my 1991 article.

RODNEY SCHROCK, KD3OR

Somerset, PA

RADIOS FOREVER LOST

I read the 1961 maximum/minimum radio price list in the 50th anniversary commemorative booklet. Now I regret the fact that I didn't have more foresight. Around 1935, when I was in high school, I used to go to the Scarsdale dump (located in a wealthier area of Westchester County, New York). I had the pick of the old radios that were discarded, but I only collected the nicer looking sets or those that I wanted to tear apart for components.

Much of the equipment was used for instruction in the high school physics lab. The physics

teacher and I were fellow experimenters. He was head of the science department of our high school (His salary then averaged around \$1,500.00 a year!). This teacher was one of the school favorites and practically a father figure for me. "Doc" and I experimented with many things after school, either in the lab or at his home. We used to have great demonstrations at school exhibits. One I recall involved talking over a light beam.

ALTON A. DUBOIS, JR.
Queensbury, NY

PRESERVATION, RESTORATION, OR REHABILITATION?

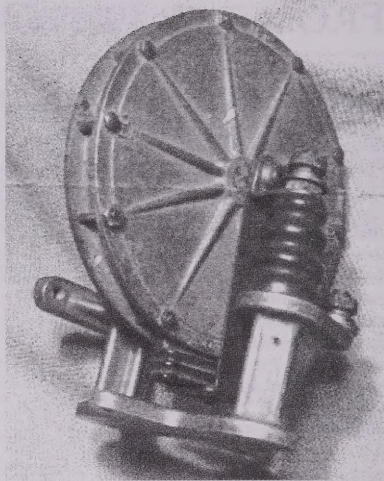
Reader Timothy Walker (Westport, CT) sent along a copy of a letter from David S. Gillespie, titled "Joyant," that appeared in the letters column of *Wooden Boat* magazine for January/February 2003. Too long to quote here, the letter outlines the national standards developed for the preservation of vessels by The National Park Service and The Secretary of the Interior. The standards make a distinction between preservation, restoration and rehabilitation that could well be applied to our work with antique radio equipment. Visit your local library and look for a copy!

GROTE WEBER'S ACCOMPLISHMENTS

Thanks to reader George Hausske (Wheaton, IL) for a clipping from his local newspaper, *The Sun*, remembering the career of Grote Weber. (See also Joyce Peckham's recollections in the February, 2003 "Letters" column.) Grote passed on in December, 2002, at the age of 90, in Tasmania, Australia. He had lived there since 1955 to research radio waves from space in an environment relatively free of man-made interference. He was a pioneer in the development of radio telescopes for astronomy—which eventually led to such landmark discoveries as quasars and pulsars. Stimulated by Karl Jansky's discovery of radio waves from the Milky Way, Weber built his own radio telescope, a 30-foot dish, in his Wheaton backyard in 1937. He picked up signals a year later and in 1941 produced the first radio map of the sky.

INFO NEEDED ON VINTAGE RCA CONDENSER

Can someone help me identify details about the theory and use of the pictured item, labeled "Model 1831 Transmitting Condenser," sold by



Can anyone provide more details on this "Model 1831 Transmitting Condenser?"

RCA and patented by Wireless Specialty Apparatus Co. of Boston? I know that when RCA was formed in 1919 the patent pool included GE, Westinghouse, AT&T and Wireless Specialty.

HARRY MILLS, K4HU
631 4th Ave. W.
Hendersonville, NC
(828) 693-7519; k4hu@arrl.net

PERHAM COLLECTION TRANSFERRED TO "HISTORY SAN JOSE"

With the dissolution of the Perham Foundation of California, its collection of more than 20,000 electronics-related artifacts and documents has been transferred to the organization "History San Jose." That organization intends to inventory and catalogue the collection, record digital images of the items, and gather key stories about the collection. Its ultimate goal is to make the collection publicly accessible via both a web page and a physical museum.

The collection was begun by Douglas H. Perham, who worked with many of the great radio pioneers including Lee DeForest. The Perham foundation was established 40 years ago by a group of Silicon Valley educators and engineers to care for the artifacts. In 1973, the collection was moved to Foothill College and remained there until the College could no longer host the museum. The items have been in storage, and in-

accessible to the public, since 1991.

The Perham Foundation members remain a cohesive group and will continue to lend their experience and expertise to History San Jose as volunteers.

LYNN CROCKER

Public Affairs Manager, History San Jose

(408) 918-1051; lcrocker@historysanjose.org

TRANSATLANTIC RADIO CENTENNIAL TRANSMISSION

On December 15, 1902 Guglielmo Marconi transmitted the first official transatlantic wireless telegraph message, from Glace Bay, Nova Scotia, Canada, to Poldhu, Cornwall, England. The centennial of this event was marked by a special stamp issued by Canada Post and a ceremonial transatlantic radio transmission from Glace Bay.



Myra Freeman (left), Lieutenant Governor of Nova Scotia, and Princess Elettra Marconi Giovanelli, Marconi's daughter, viewing a poster showing the twin communications centennial stamps after its unveiling at the Miners' Museum in Glace Bay on October 30, 2002. The left hand stamp shows a portrait of the Scottish-Canadian engineer, Sir Sandford Fleming, promoter of such projects as universal standard time, the Canadian Pacific Railway, and the trans-Pacific telegraph cable. The right hand stamp shows a photograph of Marconi at age twenty-six when he went to England to develop and commercialize his wireless telegraph. Photo courtesy Cape Breton Post.

The stamp was one of a pair of twin stamps commemorating two communications centennials: the completion of the trans-Pacific telegraph cable connecting British Columbia to Australia and New Zealand on October 31, 1902, and Marconi's transatlantic radio transmission on December 15, 1902.

One hundred years later, on December 15,

2002, Marconi's original message was transmitted again from the site of his 1902 station in Glace Bay to Poldhu, Cornwall. The message was: "Times London. Being present at transmission in Marconi's Canadian Station have honour send through Times inventor's first wireless transatlantic message of greeting to England and Italy. Parkin." "Parkin" was Dr. George Parkin, correspondent for the Times of London, who had been following Marconi's progress at Glace Bay. His message was transmitted at 10 p.m., probably at a nominal frequency around the low end of the MF band or high end of the LF band. Spark transmitter tuning at that time was anything but sharp. The ceremonial retransmission in 2002 was made at 2 p.m. AST on the 20 metre amateur band (about 14 MHz) from station VE1VAS of the Sydney Amateur Radio Club to GB2GM of the Poldhu Amateur Radio Club, both by Morse code and voice. The operator was Bill Appleton of the Sydney Amateur Radio Club. Bill's father and grandfather both worked for Marconi.

HENRY M. BRADFORD

Wolfville, N.S. Canada

DECREMENT TOO BIG

I believe there is an error in the numbers George Batterson used to describe the performance of his early 1920 spark transmitter (see quote from his *Review* Volume 1 article in the commemorative booklet *Fifty Years of AWA* on page 8). I really doubt the transmitter would have a decrement as high as 0.9 (at the lowest). If it did have a decrement of 0.9 or greater, the transmitter's oscillatory circuit probably did not oscillate at all! The "equivalent" Q at a decrement of 0.9 is about 3.5. This may not allow for a damped oscillatory condition in a parallel LC circuit. However, I'd guess that an extremely weak, but broad, frequency (impulse) may have radiated from the antenna. Also, in the time period from 1918 to 1925, the US legal "maximum" for decrement was 0.2, then lowered to 0.1, not 0.7 as indicated in the article. I reference the following publications from that period in radio history: *Practical Wireless Telegraphy* by E. E. Bucher, May 1918, page 91; *Principles Of Radio Communication* by J. H. Morecroft, 1921, page 214; *New Regulations For Transmitters*, "decrement for spark transmitters changed from 0.2 to 0.1," March 1925 *QST*, page 29.

Otherwise, the commemorative 50 year anniversary publication was excellent. Congratulations, on doing such an excellent job chronicling the history of the AWA!

FRANK LOTITO

Pittsburgh, PA

ATLANTIC SPAN DUE TO SKYWAVE?

After reading "Did Marconi Receive Transatlantic Radio Signals in 1901?" in the February, 2003 issue of *The OTB*, I wonder if Henry Bradford was too quick to dismiss the possibility of sky wave propagation.

Although "...Marconi could hardly have picked a worse combination of frequency and time of day for the transatlantic experiment..." he certainly did pick the right time of year — at the winter solstice when days are shortest. I can say, from my crystal set DXing experience, that some degree of skywave propagation persists throughout these short days, especially at northern latitudes.

From a former Maryland location (39.5 deg. N) I logged daytime receptions of MF stations in New York (240 km), Boston (540 km), Montreal (700 km) and Quebec City (910 km). Coincidentally, I recently corresponded with a fellow crystal set DXer, DK6YY, in Germany (51.5 deg. N) who commented on his similar experiences with midday skywave.

The daylight situation was not as dire as the article would have us believe. Toward the end of the transmission period, 1830Z, Poldhu (50 deg. N) was 2 hours, 10 min. past its local sunset, and

St. John's (47 deg. N) was only 1 hour, 10 min. before its local sunset. About two-thirds of the path was in darkness.

MIKE TUGGLE
Kaneohe, HI

BELOW 535 CORRECTIONS

In the February issue, on P. 64 ("Below 535" Column), please insert the following final sentence in the paragraph directly above the heading "Decremeter and GDO Limitations.": *Note the two different magnetic coupling methods, applicable to "dipping out" the parallel and series self-resonant frequencies.* The label on Fig. 9 to which this sentence refers is also missing. It should read: *Close Clip Lead For Series Resonance and Open Clip Lead for Parallel Resonance.*

In the first full paragraph in the second column on this same page, change the first two sentences to read: *For example, in the pre-WW1 era to about the mid-1920's a spark transmitter, if Q instead of decrement had been the favored descriptor for tuning sharpness, a Q below 10 was definitely illegal. If the Q was 20 or more, the spark transmitter was definitely legal. (Remember, $Q = p \div d$.)*

FRANK LOTITO
Pittsburgh, PA



FROM THE EDITOR, continued from page 5

After locating the images on Mike's site, I e-mailed him for permission to use them, inquiring if he would be willing to go back and scan the original of the cover photo at the higher resolution needed for good print reproduction. Mike graciously replied the following morning, and I had my scan by that evening.

In our next issue, we plan to run Mike's story of Armstrong's early experiments with FM, incorporating more of the wonderful Houck images.

The AWA Message Board

Back in February, I introduced our new "AWA Message Board," which had been recently designed and installed by our Web Page Coordinator Chuck Schwark. This enhancement to our web site is intended to expand further its effectiveness as an outreach medium for attracting new members. As newcomers to the site swap questions and answers on antique radio topics with our members, we hope that they will come to appreciate the value of making a permanent connection with AWA.

Participating in the message-board interchange

is a very solid, and interesting, way to help your organization grow. Any member with internet access can do it; it's as simple as clicking a mouse. We solicited your help with this last February, and several members responded. Unfortunately the board went down just as the first few messages had been posted. Our internet service provider had moved us to a different server, causing complications that took several days to work out. But Chuck has it back up now and we're soliciting your help once again. Please log onto the board regularly and post your questions and answers!

Volume Number Correction

In updating the volume number of *The OTB* last February, we accidentally went from Volume 43 to Volume 45. This issue bears the correct volume number of 44. The *OTB* Staff apologizes for creating the problem. Perhaps the best way for you to take care of the error is to go back to the February issue and change the volume number by hand. That way you'll avoid future errors in your filing system even if you happen to forget about this correction notice.—MFE



MUSEUM NEWS

Visit us on the Internet at <http://www.antiquewireless.org>

OFFICERS

Director

Thomas Peterson, Jr.

Deputy Director

Allan Pellnat, KX2H

Secretary

Edward Gable, K2MP

Treasurer

Stanley J. Avery, WM3D



BOARD OF DIRECTORS

Stanley J. Avery, WM3D

Dr. Thomas Ely, W2ODW

Ronald Frisbie*

Edward Gable, K2MP*

Prof. William Hopkins, AA2YU

Lauren Peckham*

Allan Pellnat, KX2H*

Robert Perry, W2TIX

Thomas Peterson, Jr.*

Ronald Roach, W2FUI

Ronald Walker, WA2TT

Morgan Wesson

MUSEUM CONTACT

For all inquiries about the Museum and its operation, contact Edward M. Gable, Curator, 187 Lighthouse Rd., Hilton, NY 14468. Phone: (585) 392-3088, e-mail: k2mp@eznet.net.

The AWA. Electronic Communication Museum is an IRS 501(c)3 charitable organization.

**also on AWA Inc. Board of Directors*

From the Curator

Hello from your museum crew. Timing of this issue is such that we cannot report on the results of the May 3rd AWA Spring Meet, which hasn't happened yet. No doubt everyone will have a good time and enjoy the new format—consisting of museum equipment demonstrations, sales, auctions, indoor vendors, the AM boys on-the-air from W2AN, and the museum open house showing new 2003 displays. Also new this year is wider-area advertising and opening the Meet to the public. Save the date now for next year's AWA Spring Meet, scheduled for May 1, 2004.

The Museum officially opens to the public on May 4th, and your museum volunteers have really outdone themselves to give our facility a new look for 2003. Gone are all the high walls and displays formerly in the center of the main display room; there's now a more open look and feel as you enter. New is the operational mechanical scanning TV receiver and camera, built by Peter Yanczer and a gift of Jay Whipple. This display is the result of work by long time volunteer Mike Csonotos.

The 1925 radio store has been spruced up and new lighting brightens up all those black panel radios. A liberal amount of oiling and greasing has brought the ever-popular Capehart flip changer back to life and hardly a record is broken now as it goes through an amazing sequence to turn over a 78 rpm record to play the other side. Be sure to ask for a demo of that when visiting. Also new this year will be demonstrations of recording

practices. At the museum is a rather common Webster-Chicago wire recorder, but none-the-less 50 years old, for you to use and enjoy. At the Annex, a complete set up of vintage equipment will show how high-quality 33 rpm original records are cut. When you see Jack Wenrich, John Atwood and Mike Csonotos, be sure to thank them for their hard work in restoring all of that vintage gear to like-new operating condition.

Responding to comments from you, the visitors, the Bell Labs transistor receiver is now mounted on a turntable so that historians can study all sides of this truly unique receiver. Also now on display are our newly acquired National HRO-600 and Collins KWM-1 communications pieces. I think you can visualize how much hard work your museum volunteers have done over the Winter, sometimes under less than ideal conditions, as this year's harsh Winter taxed the heating plant to its maximum.

Another fun activity by your museum was last February's 75th Anniversary observance of John Logie Baird's historic transatlantic television transmissions. In 1928, Baird and his associates transmitted the historic signals to 2CVJ in Hartsdale, NY. The equipment used at the time was Baird's 30 line spinning disk system. It is this equipment that the United Kingdom's Narrowband Television Association (NBTv) recreated to celebrate the event. The NBTv, a very large and active vintage television group, planned for over a year to make this event happen, but had no USA counterpart.

Enter NBTv's Ralph Barrett, G2FQS, a friend of AWA Board member Bob Schaumleffel,



Transmitter ID and photo of John Logie Baird as received on 15 meters from UK, by museum, using a 30-line Baird televisor. The occasion was last February's 75th Anniversary recreation of John Logie Baird's historic transatlantic television transmission.

WA2IKS. Bob suggested contacting the AWA Museum and their (as he put it) willing and enthusiastic Curator. Enthusiastic indeed as this looked like very interesting project and certainly very much in concert with the museum's mission.

The NBTv group sent a replica 30 line Baird televisor to the Museum and a Kenwood R-1000 receiver was modified to have a flat bandwidth out to 12 kHz. Tests began four weeks prior to the actual anniversary date of February 8th, with terrible results due to a total lack of propagation on the 15 meter band. Finally, just two days be-

fore the celebration, good results were achieved and dandy pictures were recorded.

One of the best pictures, shown here, was when three events occurred simultaneously; the SSB interference stopped; the pesky selective fading went away; and the signal popped out of the noise to S-9+. There it was, an almost perfect picture of the television transmitter identification, GB2KZ.

Everyone on the UK side was delighted, including Baird family members, former Baird employees and the many NBTv members present. I wish to acknowledge and thank member Bob Schaumleffel, WA2IKS, who made a generous cash donation to the museum to cover all costs associated with this event. Further information on the very active NBTv group can be had at their web site www.nbtv.wynet.co.uk. For more pictures and a more complete article on the event, go to the AWA web site at www.antiquewireless.org. While at the AWA web-site, be sure to see the new AWA Message Board where members and visitors a like can post questions to the large group of radio experts and historians found there. S'long for now, see you in August at the AWA convention.

Ed Gable

Ed Gable, K2MP/W2AN
Museum Curator

RECENT MUSEUM DONORS

(JANUARY 1, 2003 TO MARCH 31, 2003)

- ❖ Steve Auyer N2TKX 23 NIB vintage British vacuum tubes
- ❖ Charles Gleason Ten-Tec Argonaut 505, Vibroplex bug, more...
- ❖ Basil Collins Eimac, Amperex, Lewis/Kaufman, W/E, EEV TX tubes, iconoscope, 24 nice pieces
- ❖ Ed Gable K2MP.....Antenna tuning unit, BC-939-B
- ❖ Celia Rankin Tube audio equipment, speakers
- ❖ Lloyd Swackhammer, VE3IIA Books
- ❖ Malcolm Baird.....Book "John Logie Baird—a Life"
- ❖ Bud Merson Harris/RF advertising items
- ❖ Bill Roberts KE4AMZ Hugo Gernsback books
- ❖ Donald F. McLean Book "Restoring Baird's Image"
- ❖ Ray Herbert G2KU.....Book "Seeing by Wireless—The Baird TV Story"

Cash Donations:

- ❖ Michael Kincaid
- ❖ Robert Schaumleffel
- ❖ John Rollins
- ❖ Joseph Gillson, Jr.
- ❖ Bob Scupp and the New Mexico Collectors Club
- ❖ G. Barry Hodgeman

MICS AND MEN

EDITED BY **GEORGE A. FREEMAN** WITH **JANET DELL FREEMAN**, 102 E. MAIN ST.,
MADISON, IN 47250-3411. PHONE (812) 265-6878. E-MAIL RALOGEUM@AOL.COM.
PLEASE INCLUDE SASE FOR REPLY.



The Mic: Western Electric 633 "Saltshaker"

The Woman: Kathryn Kuhlman

You might not expect a high-profile radio evangelist, who once donated \$200,000 to a children's rehabilitation project, to use a low-end microphone for her broadcasts. But once you know Kathryn Kuhlman's story, her choice is understandable.

When her program came on at WBBW, Youngstown, OH, where I was a newsman in the late 1950s, we actually turned down the studio monitors. We featured contemporary music, and this lone religious program seemed to stick out like a sore thumb. It ran at 10 a.m. Mondays through Fridays.

Ms. Kuhlman's dramatic, agonizingly slow, delivery sounded overdone to many of us. Now, having read her biography, I understand why. She had been an aspiring actress as early as her fifth grade days in Concordia, MO. Though she had a real flair for the dramatic, she stuttered. The young lady learned to speak slowly lest she

precipitate a siege that she could not stop.

Ms. Kuhlman was tall and slim, with a surprising shock of curly red hair often done up in the Shirley Temple style we see here. Unlike many successful evangelists of her time, she was not interested in building a monument to herself. Her small staffs at the Pittsburgh, PA headquarters and California satellite offices operated out of Spartan facilities.

She established the Kathryn Kuhlman Foundation, which awarded scholarships at over a dozen colleges. In a biography written near the end of her life [1], Kuhlman confided that she had a complex about her own lack of education. The same source lists many of her good works.

The seven books penned by Kuhlman herself included two best sellers. Her domestic radio broadcasts covered most of the U.S. Overseas broadcasts were heard in Europe, North Africa, behind the Iron Curtain, Australia and Latin America. Ending only with her death in 1975 at the age of 68, her TV program was the longest-running half-hour program in the history of the CBS Television Network.

The inexpensive Western Electric 633 mic used by Kuhlman in her private studio was sufficient for her broadcasts. Configured as shown in this picture, taken about 1948, the 633 is a directional mic. It could have been made more narrowly directional by adding an available "Baffle Attachment." Hanging straight (upside down or standing straight up), the mic became non-directional. Weighing only 10 ounces, it could hang by its own cord and required no other support.

The 633-A was "for use with sound systems in schools, in restaurants, in hotels and in hospitals, by radio telephone amateurs and in commercial broadcasting, particularly for all remote pick-ups" [2]. The 633 design sold well enough that it was continued even after the sale of the Western Electric Microphone Division to Altec-Lansing Corp. 



Kathryn Kuhlman

[1] *Kathryn Kuhlman*, by Helen Kuhlman Hosier, Fleming H. Revell Co., Old Tappan, NJ, 1976.

[2] *Western Electric 633-A*, eleven-page manufacturer's pamphlet in author's archives.

AWA NEWS



OTB POLICY ON PROMOTING EVENTS: The OTB is pleased to list the meets and meetings of any established antique radio organization, whether or not it is associated with the AWA. Do not send your information directly to the OTB Editor. Please send it to Joyce Peckham, Box E, Breesport, NY 14816. Closing date is six weeks prior to first day of month of issue.

Calendar of AWA Activities

May 2-3

IHRSAWA
Spring Meet

May 3

AWA Museum
Board Meeting

May 3

AWA, Inc.
Board Meeting

May 16-17

Radio Daze 2003

August 20-23

AWA Annual
Conference

November 9

AWA, Inc.
Membership and
Board Meeting

November 9

AWA Museum
Membership and
Board Meeting

AWA SPRING MEET

MAY 3

"Dawn Till Gone" at the A.W.A. Electronic Communication Museum Annex building, 6910 Rt. 5 & 20 (intersection with Rt.444), Bloomfield NY—on the grounds of the American Legion Post. For details, see "Museum News" in this issue. Questions to Ed Gable, Museum Curator, at (585) 392-3088 or k2mp@eznet.net



AWA MUSEUM BOARD MEETING

MAY 3

1 p.m. at same location as AWA Spring Meet.



AWA, INC. BOARD MEETING

MAY 3

About 2 p.m. (following Museum board meeting), same location.



Calendar of Meets

(AWA logo identifies AWA-sponsored events)

VINTAGE RADIO AND COMMUNICATIONS MUSEUM OF CT 2003 SWAP MEET SCHEDULE

All meets to be held at the Museum, located at 33 Mechanics St., Windsor, CT. Dates: June 7 (outdoors), September 13 (outdoors), December 6 (indoors). Contact: John Ellsworth, Museum Director, at radioclctr@aol.com or (860) 673-0518.

IHRSAWA SPRING MEET

MAY 2-3

Indiana Historical Radio Society and AWA present their 32nd annual regional radio festival. The meet will be held at the Johanning Civic Center located at 1500 North Reed Road (US-31) on the north side of Kokomo, Indiana. Many restaurants and motels are within a very short drive. A snack bar will be provided by the Civic Center. Tentative set up times: 2 p.m. Friday with swap and sell from about 4 p.m. to 8 p.m., then Saturday from 7 a.m. to 3 p.m. There is plenty of space to set up inside the very large new facility. Vintage radio contests and radio operational and repair seminars are scheduled. For additional information call Fred Prohl, 812-988-1761 or email him at indianahistoricalradio@att.net. The IHRSA web site is at www.indianahistoricalradio.org



RADIO DAZE 2003

MAY 16-17

Sponsored by the Northland Antique Radio Club, AWA, and Pavak Museum of Broadcasting. At Comfort Inn of Plymouth, I94 and Highway 55, Plymouth, MN. (763) 559-1222. Mention NARC for special room rates. Flea market begins at dawn on Friday and Saturday. Auction, contest, luncheon. Saturday program features a talk by Martin Blankinship, noted Zenith collector. For more information: Contact Jim Thompson (612) 822-4000, Ed Ripley (651) 457-0085, NARC, P.O. Box 18362, Minneapolis, MN 55418, or see NARC website: geocities.com/TelevisionCity/4544/



EAST CAROLINA ANTIQUE RADIO CLUB ANNUAL SWAPFEST

MAY 24

Co-sponsored by ECARC and Kiwanis Club. 8 a.m. to 3 p.m. at 177 Forelines Rd., Winterville, NC 28590. Free admission; inside tables \$15.00; outside tailgate, \$10.00. Contact Herman Schnur, K4CTG, 3205 Brick Kiln Rd., Greenville, NC 27858; 252-752-2264; hschnur@cox.net.

RADIO-ACTIVITY 2003

JUNE 6-8

This year the meet is held over more of the

weekend, on Friday through Sunday. No events scheduled for Thursday. You'll find the same great lineup of events including the big flea market (starts Friday morning), old equipment contest, seminars, awards banquet, and auctions. Same location as last year: the Sheraton College Park in Beltsville, MD, conveniently located between Baltimore and Washington, DC at I-95 exit 29B at the southwest corner of the interchange. Hotel reservations (group code MNG) can be made at 301-937-4422. Info: Lynne Bushong at P.O. Box 274, Fulton, MD 20759 or visit our web site at www.maarc.org.

AWA ANNUAL CONFERENCE AUGUST 20-23



At Rochester Institute of Technology Conference Center (formerly Thruway Marriott). I-90 Exit 46 to I-390 North to NY253 West to NY 15 South. RIT info number: (585) 359-1800. Also see CONFERENCE PREVIEW section in this issue.

AWA, INC MEMBERSHIP AND BOARD MEETING NOVEMBER 9



At RIT Conference Center (see above). Membership meeting at 11 a.m. All members welcome. Board meeting follows.

AWA MUSEUM MEMBERSHIP AND BOARD MEETING NOVEMBER 9



Same location as above. Membership meeting (all members welcome), followed by Board meeting, begins at conclusion of AWA, Inc. board meeting.

Recurring Meetings & Events

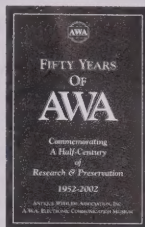
•Antique Radio Collectors of Ohio—meets first Tuesday of each month at 2929 Hazelwood Ave., Dayton, OH (4 blocks east of Shroyer Rd. off Dorothy Lane) at 7 p.m. Also annual swap meet and show. Membership: \$10.00 per year. For more info, contact Karl Koogle: mail to above address; phone (937) 294-8960; e-mail KARLKRAD@GEMAIR.COM

•California Historical Radio Society—For info on current meetings, call the CHRS hotline: (415) 821-9800.

•CARS, the Cincinnati Antique Radio Society—Meets on the third Wednesday of each month at ITT Technical Institute, 4750 Wesley Ave., Norwood (Cincinnati) Ohio. For more information contact Greg Tierney, (513) 732-1844, or Bob Sands, (513) 858-1755.

50TH ANNIVERSARY COMMEMORATIVE BOOKLET

Fifty Years of AWA was recently mailed out to all members. The publication has received high marks from almost everyone who has seen it. We still have a stock of this profusely-illustrated 60-page AWA history available for those who would like extra copies or those who were not members at the time of distribution and didn't receive one. Cost is \$7.00 per copy postpaid, no limit. But once they're gone they're gone—so act now if you are interested! Send your check to Joyce Peckham, Box E, Breesport, NY 14816.



•Carolinas Chapter of the AWA—Hosts four “mini-swap-meets” each year (in January, May, July and October) plus an annual conference, “Spring Meet in the Carolinas,” on the 4th weekend in March. Executive committee meets approximately quarterly. For more info, visit the web site at CC-AWA.ORG or contact Ron Lawrence, KC4YOY, Chapter President, P.O. Box 3015, Matthews, NC 28106-3015; phone (704) 289-1166; e-mail kc4yoy@trellis.net

•Central Ohio Antique Radio Assn.—Meets at 7:30 p.m., third Wednesday of each month at Devry Institute of Technology, 1350 Alum Creek Rd., Columbus. (1-70 Exit 103B). Contact: Barry Gould (614) 777-8534.

•Cincinnati Antique Radio Society—Meets at 7:30 p.m., third Wednesday of each month, at Great Oaks Institute, Scarlet Oaks Campus, 3254 E. Kemper Rd., Sharonville, OH 45241. For info and directions, call Tina Hauke at (513) 771-8840.

•Delaware Valley Historic Radio Club—Meeting and auction begins 7:30 p.m. on the second Tuesday of each month. Location: Telford Community Center on Hamlin Ave. in Telford, PA. Annual dues: \$15.00, which includes a subscription to the club's monthly newsletter *The Oscillator*. For more info contact Delaware Valley Historic Radio Club, PO Box 5053, New Britain, PA 18901. Phone (215) 345-4248.

•The Downer's Grove (IL) Park District Museum sponsors a monthly “Collector's Hour.” Participants have the opportunity to display collections at the facility for several weeks before making their individual presentations. The event

With the Chapters

CC-AWA CHAPTER NEWS

Hello from the Carolinas. It was just a little over a week ago that we wrapped up the 2003 Charlotte CC-AWA Annual Conference: the "Spring Meet in the Carolinas." As always, we had three days of "radioing our brains out." Things started out a little shakily on Thursday morning as I drove to the Sheraton in a torrential downpour. For a while it looked like we might have to use our "rain out" contingency plan worked out with the Sheraton management.

The management was good enough to move some folks around so that they could fill a large ballroom with tables. They also offered to line the halls of the first floor common areas with tables, if necessary, to accommodate everyone that might need a space. Fortunately, we managed to dodge the rain. It stopped about mid-day Thursday.

Our Thursday afternoon "Program/Forum" session was dedicated to Restoration/Preservation "Hints & Kinks." Ted Miller, Robert Lozier, Stan Watkins, Larry Dowell & Mark Oppat gave demonstrations of cleaning and saving an original finish, making plastic dial lenses, nickel plating and repairing speaker cones. After the Forums we had a quick CC-AWA Annual Membership meeting before we all boarded the hotel's airport shuttle buses for a trip to the "world famous" Open Kitchen Italian Restaurant for dinner. We almost filled their private dining room with around 34 diners.

We got back to the Sheraton just in time for a great presentation by Mark V. Stein on "Modern Radio Design and Popular Culture." The main meeting room sits 200 and it was almost full. A GREAT presentation, thanks Mark. After the Mark's talk ended we opened the contest room so folks could view the entries so far.

A very special guest that joined us this year and viewed the contest. He was Alfred H. Grebe Jr. the son of the founder of Grebe Radio. Al had been to the Charlotte meet before, way back in 1982.

Friday morning started off a little foggy and misty, but there was no rain. We kept to our traditional "LeMans Start" where everyone is required to leave the flea market area until 8 a.m. By about 10 o'clock the clouds were breaking up and sun was starting to shine. The reports from those that were shopping indicate that there was a bunch of good stuff for sale.

Our annual equipment auction was scheduled for Friday afternoon. I was really worried that

our auctioneer Brad Jones, a news anchor with the Greensboro TV station, might not be able to make it because of the Iraq war. But being the trouper that he is, Brad did come through, even making an extra trip to Charlotte Thursday just to bring his PA system for us to use Friday morning. As it happens, Brad won the reinstated CC-AWA

President's Award this year. Congrats Brad, you deserve it!

The auction this year was great. Everything had been entered by individual owners and there were a num-

ber of nice pieces. There were no estate items or other large lots. Our annual banquet was on Friday evening. This year, 52 people joined us for a nice steak dinner. Al Grebe and his sister and cousin were there. Afterwards he spoke about the saving of the original Grebe Radio building, now part of a hospital and named the "Alfred H. Grebe Building." Another piece of radio history saved from the wrecking ball.

Along with Al Grebe we were pleased to hear a few words from our friend and the new President of the AWA. Geoff Bourne and Gracie have been attending the Charlotte Conference for a number of years but this is the first year as AWA President. The last time we were honored with a presidential visit was in 1982, when Chuck Brelsford and his wife attended the event.

Saturday morning the weather was bright and clear and there was lots of buying and selling going on in the flea market. Things get kind of busy on Saturday morning. Along with the flea market we also have the final contest check-in and then the judging, also our "Radio Rescue" end-of-meet auction. Then we wrap up with the CC-AWA members' luncheon at 1 p.m.

After lunch it's time to check out the contest awards and start packing to go home. This year there were 301 registered attendees (not including spouses or other family members) and 135 flea market spaces were sold. And I'd like to thank the many volunteers without whom this event would not be possible.

The next event for the Carolinas Chapter is our "Spring Swap Meet" at the North Carolina Transportation Museum "Spencer Shops," in Spencer NC, on Saturday morning May 10th. As always admission to our Saturday swap meets is FREE. Setup is also FREE. Things will get started at around 7:30 a.m. and wrap up before noon.

Detailed information and driving directions can be found on the CC-AWA web page at cc-awa.org.



is open to the public with no admission charge. The museum has also begun to sponsor a yearly "Collector's Fair." For more info, contact Mark Harmon, The Downer's Grove Park District Museum, 831 Maple Ave., Downer's Grove, IL, 630-963-1309, fax 630-963-0496, mharmon@xnet.com.

•Houston Vintage Radio Association—Meets second Tuesday each month (except Jan. and Dec.) at Lai Lai Restaurant, Tides II Motel, Houston Medical Center, Main and Holcombe Sts., Houston, TX. Meetings include auction/program, 7-10 p.m. Assoc. publishes *Grid Leak* quarterly, monthly activity announcements. Membership \$15/yr. Write: HVRA, P.O. Box 31276, Houston, TX 77231-1276, or call Richard Collins, (713) 778-0721.

•Hudson Valley Antique Radio & Phono Society—Meets third Thursday of month, 7 p.m. Meeting, swap meet, and membership info: Peter DeAngelo, President, HARPS, 25 Co. Rt. 51,

AWA NETS (EASTERN TIME)

PHONE:

SUNDAY:

7244 kHz, SSB, noon (NCS:WA4IAM);

3837 kHz, AM 4:30 p.m.

NCSs:W2ZM & W2AN)

TUESDAY:

14274 kHz, SSB, 2:30 p.m. (NCSs: KC3YE and W0FXY)

3837 kHz SSB, 8 p.m. (NCS: WB2SYQ)

MONDAY-WEDNESDAY-FRIDAY:

3867 kHz, SSB, 9:30 a.m. (NCS: W20BJ)

CW:

DAILY, 4 p.m., 3588 or 7050 kHz. Protocol, informal. Check both frequencies for activity and join in, or call AWA de (your call) and see What you stir up. First WEDNESDAY of each month, 8 p.m., 7050 kHz

2-M REPEATER (Rochester Area)

MONDAY, 7:30 p.m. (NCS: K2GBR)

Receive 145.290 MHz

Transmit 144.690 MHz

AWA LIFE MEMBERSHIPS ARE NOW AVAILABLE



Cost: \$400 (U.S.)/\$500 (Elsewhere)

Send your check to AWA Secretary Joyce Peckham, Box E, Breesport, NY 14816.

Phone (607) 739-5443.

E-mail: awapeckham@aol.com.

Campbell Hall, NY 10916. (914) 496-5130.

•Indiana Historical Radio Society—Meets quarterly in Feb., May, Aug or Sept and Oct. Flea market and Old Equipment Contest at all events. Auctions at all but Feb. meet. The *IHRS Bulletin* has been published quarterly for the past 32 years. For meet details and information about the club and our Indiana Historic Radio Museum in Ligonier, IN see our Web site at www.indianahistoricalradio.org or contact Herman Gross, W9ITT, 1705 Gordon Dr., Kokomo, IN 46902-5977, (765) 459-8308, w9itt@mindspring.com.

•London Vintage Radio Club—This Ontario, Canada club meets in London on the first Saturday of January, March, May, June and November. Annual flea market held in Guelph, Ontario in September in conjunction with the Toronto club. Contact: Lloyd Swackhammer, VE3IIA, RR#2, Alma, Ontario, Canada N0B1A0. (519) 638-2827. E-mail contact is Nathan Luo at lvrceditor@yahoo.com.

•Mid-Atlantic Radio Club—Meets monthly, usually the third Sunday of the month at the New Hope Seventh Day Adventist Church, Burtonsville, MD. Contacts: President, Geoff Shearer, 14408 Brookmere Dr., Centreville, VA 20120, e-mail gshea90278@aol.com; Membership Chair, Paul Farmer, (540) 987-8759, e-mail: oldradiotime@hotmail.com. Website www.maarc.org

•New Jersey Antique Radio Club—Meets second Friday each month, 7:30 p.m. Holds three annual swap meets. Contact (send SASE) Phil Vourtsis, 13 Cornell Pl., Manalapan, NJ 07726, (732) 446-2427.

•Northland Antique Radio Club—hosts four events with swap meets each year (in February, May, September and November) including an annual conference, "Radio Daze," for two days in mid-May. Annual dues are \$12.00, which includes a subscription to the club's quarterly newsletter. For more info, visit our web site at www.geocities.com/northland.geo/; contact Ed Ripley at (651) 457-0085; or write NARC, P.O. Box 18362, Minneapolis, MN 55418.

•Northwest Vintage Radio Society—Meets second Saturday of each month (except July and

August), at or about 10 a.m., at Abemathy Grange Hall, 15745 S. Harley Ave., Oregon City, OR. Members display radios, exchange information. Guests welcome at all meetings and functions, except board meetings. For info, write the Society at P.O. Box 82379, Portland, Oregon 97282-0379.

•Oklahoma Vintage Radio Collectors—Oklahoma City Chapter meets second Saturday each month, at Hometown Buffet, 3900 N.W. 63rd St., Oklahoma City, OK. Visitors welcome. Dinner/socializing, 6 p.m.; meeting at 7 p.m. Membership, \$12/yr., includes monthly *Broadcast*

News. Info: SASE to OKVRC, P.O. Box 50625, Midwest City, OK 73140-5625; or contact Fred Karner at (405) 769-4656 or fkarnr@cox.net; or visit our web site at <http://members.cox.net/okvrc/>.

•Ottawa Vintage Radio Club—Meets monthly (except June and July) in Conference Room, *Ottawa Citizen*, 1101 Baxter Rd., Ottawa, Ontario. Contact: Tom Devey, 601-810 Edgeworth Ave., Ottawa, ON K2B 5L5, (613) 828-5152. Membership: \$10 Canadian/yr.

•Pittsburgh Antique Radio Society welcomes visitors to our Saturday flea market/contests in

Nominations for AWA Awards

It is time to nominate candidates for six prizes to be given at the annual conference.

The AWA Houck Award for Documentation goes to an AWA member who has written several original articles on radio development or history in *The OTB*, *AWA Review*, or other publication. (This can include a book on a related subject.)

The AWA Houck Award for Preservation is for a member who, through personal accomplishment, has acquired and preserved by documenting an outstanding collection of radio artifacts. Send your selection(s) to the Houck Awards Administrator, giving your reasons why the nominee(s) should receive the Award. The address: Barney Wooters, 8303 E. Mansfield Ave., Denver, CO 80237.

The Bruce Kelley-OTB Award is given to the member who publishes in *The OTB* an article judged to be the most outstanding, original, historical presentation of the award year. For this year, articles in the August and November 2002 and February and May 2003 issues will be considered. The articles must have been written specifically for publication in *The OTB*, not reprinted from other journals. All AWA members are eligible for this award except those on the Award Committee and the *OTB* Editor. Simply identify the article and the nominee, with reasons for your selection; send to committee chairman Bob Thomas, W3NE, 216 Sunrise Lane, Philadelphia, PA 19118.

The J. Albert Moore Award is a newly-instituted companion to the Bruce Kelley-OTB Award. The award comes to us through The Antique Radio Club of America, which was merged into AWA a few years ago. It was originally given for the most outstanding arti-

cle (any category) contributed to the *ARCA Gazette* during the publication year. Though the award continues a memorial to Mr. Moore's contributions to *ARCA*, it has been re-oriented as a companion to the Bruce Kelley-OTB Award—honoring articles that do not fall into the historical category considered for the latter. And so the Moore award will be given "... to the article, or series of articles, deemed to be the most outstanding of those dealing with radio hardware (radio sets, radio systems or components) printed in the *OTB* during the award year. Eligible articles include those dealing with troubleshooting, restoration, performance evaluation, identification methods, and history." For this year, articles in the August and November 2002 and February and May 2003 issues will be considered. All AWA members are eligible for this award except those on the Award Committee and the *OTB* Editor. Simply identify the article and the nominee, with reasons for your selection; send to committee chairman Thomas F. Peterson, Jr., 3060 Lander Rd., Cleveland, OH 44124.

The Taylor Award, in memory of John Taylor, RCA TV Developer, is for "preserving television history." Submissions are invited here, too, to Peter Yanczer, 835 Bricken Pl., Warson Woods, MO 63122.

The Tyne Tube Award is presented, in remembrance of Gerald F.J. Tyne, for contributions to preserving or documenting the history of tube technology. Nominations may be sent, with supporting reasons, to administrator Lauren Peckham, Box E, Breesport, NY 14816.

Please send nominations for all awards by July 25, 2003.

Presentations Needed For Moonlight Restorations Program

Interested in giving a short talk (15-minute limit) on a favorite radio restoration topic? The Moonlight Restorations Program, to be given Wednesday Evening (August 28th) at the Conference, is looking for a few good presentations. To discuss or sign up, contact Marc Ellis at 847-869-5016 or mfellis@enteract.com.

March, June, September, and December. An auction is included in September, and our annual luncheon/program is held the first Saturday in December. Our newsletter, *The Pittsburgh Oscillator*, is published quarterly. Website: www.nb.net/~schaefer/pars.html For directions, specific dates, information call President Bonnie Novak at 412-481-1563 or write to Karl Laurin, 8111 Sally, White Oak, PA 15131.

•Society for Preservation of Antique Radio Knowledge—Meets at 7:30 p.m. the second and fourth Tuesdays of each month in the party room at Cassano's Pizza Parlor, 1700 East Stroop Rd., Kettering, OH. Membership, \$18/year. Write SPARK Inc, P.O. Box 292111, Kettering, OH 45429; e-mail sparkinc@juno.com or call John Pansing at (937) 299-9570.

•Texas Antique Radio Club—Meets alternate months in Kyle and Shertz, TX. Contact: Ron Manning, President TARC, 133 East Huisache Ave., San Antonio, TX 78212. Phone (210) 734-6831; e-mail ronmeg@gateway.net; website www.gvtc.com/~edengel/TARC.htm

Service Sources Available

The AWA Source Sheet is a listing of parts suppliers and services for the radio collector. Cost: only a business-size self-addressed stamped envelope to AWA, Box E, Breesport, NY 14816.

AWA Slide/Video Program

The Antique Wireless Association has available several historical documentaries to loan to affiliated organizations for club meetings and programs. There is no charge for this service other than return mailing cost. For info on loan conditions, to make reservations, or just inquire, contact Ed Gable, Curator, AWA Electronic Communication Museum, 187 Lighthouse Rd.,

Hilton, NY 14468. The following are available:

VHS VIDEO PROGRAMS

V-2 — "Electrons on Parade." 18 min. 1938 movie made at RCA's Harrison Plant showing production lines with closeups showing receiving tubes, including a short sequence on transmitting tubes. (Very rare movie.)

V-4 — "The British Receiver." Documentary of the AWA/BVPS meet with visit to Marconi's Chelmsford plant, the British Science Museum, and ending with series of collectible British receivers. (VHS program transferred from slides.)

V-5 — "The Early Years." Historical documentary narrated by Clarence Tuska telling of the early years of amateur radio, founding of the ARRL and WW I military radio training school. (VHS program transferred from slides.)

V-6 — "The Key." History of the telegraph/radio key covering early hand keys, semi-automatics and commercial types. Script by Lou Moreau, W3WRE. (VHS program transferred from slides.)

V-9 — "The Transatlantic Tests and IBCG." Rare documentary/photographs showing early amateur operation leading to famous 1921 transatlantic tests.

V-12 — "Those Wonderful Magazine Covers." The story of radio through magazine covers. Colorful with period music.

V-15 — "The WHAM Story." Details development of a pioneer radio station in Rochester, NY. Program developed with assistance and recollections of Art Kelly, the station's former general manager.

V-16 — "The Charles Herrold Story." Video prepared by Mike Adams who donated this copy to the AWA. It documents the work of broadcasting's Forgotten Father who started broadcasting in 1912.

SLIDE PROGRAMS

S-1 — "Portrait of a Pioneer." The life of Elmo Pickerill.

S-2 — "Polar Adventure." Pictures taken by Bud Waite and his narration describing numerous trips to the Antarctic over a 35-year period.

S-3 — "70 Years of Vacuum Tubes." Describes the history of vacuum tubes.

S-4 — "The Early Years." (See description for V-5.)

S-7 — "The Transatlantic Tests and IBCG." (See description for V-9.)

S-8 — "Trip Through the AWA Museum" Covers exhibits and equipment.

S-12 — "The Key." (See description for V-6.)

AWA ANNUAL CONFERENCE

RIT Conference Center (formerly Thruway Marriott), Rochester, NY
August 20-23, 2003

Theme: *Frequency Modulation*

WELCOME BACK! At the 42nd annual conference, collectors and history enthusiasts will convene, exchange equipment, and learn more about the development of radio and electronics. If you have never been to the yearly "reunion," why not give it a try? Rochester (Henrietta) is just north of upstate New York's beautiful Finger Lakes region, easily reached by car or plane. The site is 26 easy miles from the AWA Museum at Bloomfield.

Advance registration is encouraged to facilitate preassembly of registration materials and preassignment of flea market spaces. Your materials for advance registration will be included in the August issue of *The OTB*. There will be unlimited registration at the door.

The conference site is The Rochester Institute of Technology Conference Center. Formerly the Thruway Marriott Hotel, This is the same facility where we've been running the conference for many years. It offers special nightly rates (\$89.00 for a single or double) on a bloc of rooms that will be reserved for the conference until July 27th. It's first-come-first-served, so get your reservation in early. For info or reservations, call (585) 359-1800. The conference center has restaurant facilities, and other lodging

and eating places are nearby.

The hotel is reached from Exit 46 of the New York State Thruway (I-90): take I-390 north to NY 253 west, to NY 15 south. For visitors arriving by air, the location is about seven miles or 15 minutes from the airport. There is shuttle service, 6 a.m.-11 p.m. (specify the RIT Conference Center). If you take a cab, make sure the driver understands that you are NOT going to the RIT campus, but rather to the RIT Conference Center, which was formerly the Thruway Marriott Hotel.

Conference Chairperson
HUGH DAVEY

Program Chairperson
LAUREN PECKHAM

Registration
JOYCE PECKHAM

Contest Chairperson
GEOFFREY BOURNE



AWA ELECTRONIC COMMUNICATIONS MUSEUM

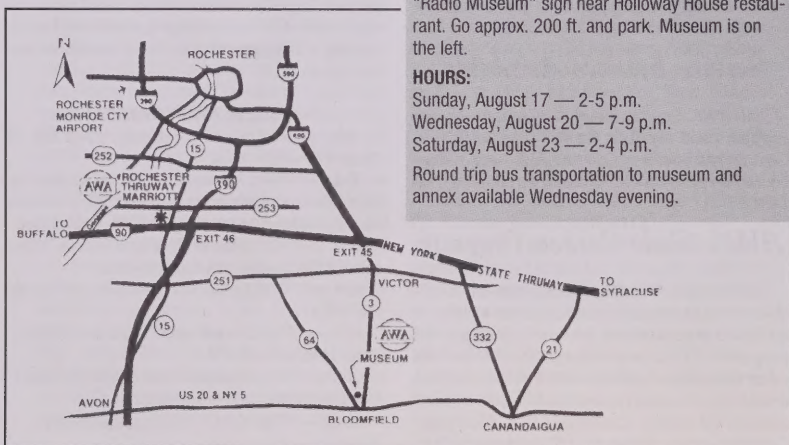
VILLAGE GREEN, BLOOMFIELD, NY

Refer to map at left. Directions from hotel: Right (south) on Rt. 15. At Avon (9.5 mi.), left (east) on Rts. 5 & 20. At Bloomfield (16 mi.), left at brown "Radio Museum" sign near Holloway House restaurant. Go approx. 200 ft. and park. Museum is on the left.

HOURS:

Sunday, August 17 — 2-5 p.m.
Wednesday, August 20 — 7-9 p.m.
Saturday, August 23 — 2-4 p.m.

Round trip bus transportation to museum and annex available Wednesday evening.



PROGRAMS

THEME: FREQUENCY MODULATION

AWA MEMBERS' FORUM

Discussion of activities led by President Geoff Bourne

SHORTWAVE AND COMMERCIAL RADIO

Presenter: Bart Lee

KEY AND TELEGRAPH SEMINAR

Moderated by Tom Perera

Panel to include Gil Schlehman, Franz Pichler, Russ Kleinman

MOONLIGHT RESTORATION FORUM

Hosted by Marc Ellis

EARLY TELEVISION DEVELOPMENT

Presenter: Peter Yanczer

FM HISTORY

Presenter: Ludwell Sibley

WHO REALLY INVENTED THE TRANSISTOR?

Presenter: A.C. Sheckler

THE STATUS OF RADIO MUSEUMS

Panel Discussion Moderated by John Terrey

Curators from prominent museums will discuss activities and concerns

REVIEW OF AMATEUR OPERATION

John Rollins, W1FPZ

THE SLIDE WIRE BRIDGE, OPERATION AND HISTORY

Presented by Dale Goodwin

PRE-1912 WIRELESS AND ELECTRICAL APPARATUS

Discussion and Display of Early Devices

Moderated by Lauren Peckham

Among the many other activities in store for you are the outdoor flea market, indoor book fair, ladies' luncheon, old equipment contest, annual sightseeing excursion, bus trip to AWA museum and annex. We plan a vacuum tube and main auction to include broadcast receivers, amateur equipment and more! The awards banquet will be on Friday evening and the Finale Luncheon Saturday at noon.

Complete conference schedule and registration material will be included in the August issue of *The OTB*.

— See next page for Old Equipment Contest categories —

THE OLD EQUIPMENT CONTEST 2003 AWA CONFERENCE

THEME: FREQUENCY MODULATION

Whether to consider Frequency Modulation "antique" has been a controversial subject for many years, and may raise some eyebrows now. However, 2003 marks the 70th anniversary of Edwin Howard Armstrong's first disclosure of wide band frequency modulation to David Sarnoff and RCA in March, 1933. Of course, it would be many years before regular FM broadcasting became available to the public, and it was not until the early 1980s that FM surpassed AM in the number of listeners. Along the way, many unusual products emerged as engineers pushed radio technology to its limits to build practical equipment that operated at frequencies and bandwidths far beyond any previously attempted.

Aside from use as a broadcasting medium, FM found many other applications in military, commercial two-way, and amateur communications. FM techniques also opened new doors in electronics technology, paving the way for things such as phase modulation, videotape recorders, and computer data recording.

As always our major contest categories include a group closely related to the conference theme (The Theme Categories) as well as a group associated with antique radio in general (The Standard Receiver Categories). There are also categories for items relating to amateur radio (the Amateur Radio Categories) and the display of restoration craftsmanship (The Craftsman Categories).

THE THEME CATEGORIES

1. PROTOTYPE FM EQUIPMENT

The first commercially-available FM receivers did not appear until the late 1930s. However, prior to that time, a few companies such as General Electric and Radio Engineering Labs built limited quantities of tuners, receivers, transmitters, and test equipment for demonstration and experimental purposes. Of course, E.H. Arm-

strong, his associates, and other engineers and experimenters built their own equipment. This category is for FM artifacts from the days before regular FM broadcasting. Transmitters, modulators, and related equipment built for the original Yankee Network and other pioneering FM broadcast stations would fall into this category.

2. PRE-WAR FM

By 1940, a number of manufacturers including E.H. Scott, GE, Stromberg Carlson, Magnavox, Meissner, and Philco offered FM receivers in their product lines. Transmitting equipment was commercially available from REL and other manufacturers.

FM was mandated by the FCC for the sound portion of television broadcasting in 1940, making early TV sets good entries in this category. Documentation of pre-war FM broadcasts and broadcasters would also be welcome here.

3. EARLY TWO-WAY FM

Fred M. Link began selling FM two-way radio systems to police departments in the late 1930s. The U.S. Armed Forces adopted FM for some communications systems during World War II. Owing to the difficulties in converting this type of equipment to other uses after it was superseded, very little of it has survived to the present day in unmodified condition.

4. POSTWAR COMMERCIAL FM IN THE HOME

Following the war, the future looked bright for FM until the FCC decided to move the service from its original band (42 MHz to 50 MHz) to the present band (88 MHz to 108 MHz). Some manufacturers responded by building sets with both the "old" and "new" FM bands. When the old band was shut down in 1948, companies which had not already done so were forced to scramble to find tubes and circuits that would work at much higher frequencies than any previously used in consumer radios. Many unusual

circuits and design concepts emerged as engineers struggled to build affordable products that offered acceptable sensitivity, stability, and fidelity. Table-top FM radios, high fidelity equipment, and consoles from the 1945 to 1950 era would be entered in this category.

5. POSTWAR FM TRANSMITTERS

Although cost is not as big a factor in the design of commercial transmitters as it is in consumer products, engineers designing FM broadcast transmitters and antennas in the era following World War 2 were faced with formidable technical challenges. Documentation, chassis sections, and complete transmitters of manageable size and weight would be welcome here.

6. POSTWAR TWO-WAY FM

The immunity of FM to noise made it a natural choice for vehicular two-way communications systems. With the development of rugged and reliable equipment that could tolerate life on the road, police and fire departments, ambulances, public transit systems, taxi services, and numerous other delivery companies installed two-way FM radio equipment to handle dispatching and other needs. Motorola became the biggest name in this field, but along the way, they had plenty of competition from RCA, General Electric, and others.

Narrow Band FM (NBFM) enjoyed considerable popularity among radio amateurs. A vintage amateur NBFM station, whether commercial or homebrew, would be a suitable entry for this category.

7. FM INNOVATIONS

By the mid-1950s, FM had become established among hi fi enthusiasts and some home listeners. Manufacturers and entrepreneurs sought to introduce FM "firsts" wherever they could. A complete Hastings FM automobile radio would make a fine entry in this category, as would a Hastings shirt-pocket FM receiver. Early transistor FM radios would also be interesting entries.

8. FM TAKES OFF

From the late 1950s through the early 1970s, more and more listeners turned to FM for high fidelity programming that was fundamentally different than what was available on AM. High quality multiband FM radios were imported from Germany in large quantities, and American, Japanese, and other offshore manufacturers responded with a tremendous variety of FM

receivers that included hi-fi components and "home entertainment centers," table radios in every quality and price range, to the simplest shirt-pocket portables.

As FM gained acceptance, broadcast equipment manufacturers improved their product lines. Transmitters that offered superior performance, less complexity, and easier maintenance were developed, and truly high fidelity studio equipment was introduced. This category is for these later examples of FM's main growth spurt.

9. FM IN STEREO

With the introduction and success of stereo phonograph records and stereo film soundtracks in the late 1950s, proposals were made to add a second audio channel to radio. Early efforts were made with "binaural" systems, where one channel would be sent by a FM station and the other on AM, but this proved difficult to manage on a regular basis. The FCC also saw a need to end the simulcasting of AM programming on FM, and the binaural system appeared to be a step in the wrong direction.

One of the more unusual aspects of FM demonstrated by Armstrong in the 1930s was the ability to carry additional channels as subcarriers. Little use was made of this initially, but with the demand for stereo, a number of different systems were developed to carry both channels on one FM signal. The FCC adopted the present system, which was developed by Zenith and GE, in 1963, but not before stereo adapters were placed on the market by some of the other proponents. Binaural equipment, and early FM stereo modulators, multiplexers, and receiver adapters would be entered here.

10. OTHER DEVELOPMENTS

When he began his research, Armstrong's chief goal was to develop a radio system that would be free from the most common forms of interference. That wide band FM also proved to be capable of much higher fidelity than AM was an unexpected bonus. In trying to comprehend why this happened, Armstrong opened many new doors in the field of information theory. Other researchers have used these principles to develop a wide variety of other products such as videotape recorders, early types of computer disk drives, phase modulation, and so forth. This category is for items which are not necessarily radio-related, but which are based on FM theory. Documentation explaining how the item(s) being displayed relate to FM should be included.

11. ARMSTRONG

Considered by many to be the last of the great lone American inventors, Edwin Howard Armstrong was responsible for many of the most significant developments in radio during the first half of the 20th Century. Wide band FM, which he single-handedly discovered, was his crowning technical achievement. He wrote and presented numerous papers on it, which had dramatic impact on the fields of electronics engineering and information theory. But it is also fair to say that FM probably would not have survived the political and economic challenges it faced from both long-established AM broadcast interests and the burgeoning television lobby without Armstrong's determination and courage. This category is for documentation and artifacts of Armstrong's life, work, and struggles in bringing FM to fruition.

THE STANDARD RECEIVER CATEGORIES

12. PASSIVE RECEIVERS

Any detecting device, not including vacuum tubes or solid state amplifying devices whose purpose is to convert radio energy into intelligible signals.

13. 1920s SUPERHET RECEIVERS

Any receiver which employs the superheterodyne circuit and is from the 1920s can be entered here.

14. 1920s TUNED RF RECEIVERS

During the 20s, the TRF set was one of the most widely produced designs on the market. It was sold in kit form, factory assembled or built from scratch from magazine plans. This is where you would enter a Freshman Masterpiece, an AK 20 and so on.

15. 1920s REGENERATIVE and REFLEXED RECEIVERS

Many manufacturers employed different circuits to improve the receiving capabilities of their radios. The regen and reflex are a few of many circuits that were used. Bring in a fine example of this type of radio.

16. CATHEDRALS, TOMBSTONES and CONSOLES 1930s and 1940s

These are probably the best known of the antique radios. Just about everyone remembers

someone in his or her family having one of these. So bring in that Philco 90, or Zenette or any other cathedral, tombstone or console radio. We will split the category if enough entries show up.

17. RADIOS IN DISGUISE

Entries here can range from an end table radio to a lamp radio. There are many different styles and variations. Some fine examples would be a Porto bar radio, Melody Cruiser ship radio, or any radio made to look like something else.

18. SPEAKERS

A. HORN: Any sound reproduction device can be entered here as long as it employs a horn or bell for sound amplification.

B. CONE: When radio sets obtained greater power output levels, the magnetic speaker unit was designed with larger surface areas for better sound reproduction. There are many fine examples of this type of speaker. i.e. Tower Adventurer, Western Electric,...

19. TEST EQUIPMENT

Many people have requested this contest category and this is the third year it has been included. There were too many makers of test instruments to list, but a sampling would include Supreme, Superior, Hickok, Weston, Read-Rite, General Radio, Simpson, Rider, and RCA. So surprise us, bring in the unusual or the common.

20. TUBES

In this category you can display a single tube or a collection. There should be a common theme with the display, such as historical significance, technological breakthrough, etc. The display should tell a story.

THE AMATEUR RADIO CATEGORIES

21. SPARK TRANSMITTERS and ARTIFACTS

Do not hesitate to enter a major piece of spark equipment if you think it is rare or historically significant.

22. VACUUM TUBE TRANSMITTERS and RECEIVERS

Some of the sets for this class are old, some not so old, most home-built. While the predominant

entries have been amateur-operated, commercial equipment is welcome.

THE CRAFTSMAN CATEGORIES

23. RESTORATION OF APPEARANCE

The purpose of this category is to display examples of rebuilding and refinishing the cabinets and containers that were used to house radio receivers. There is no requirement for a particular kind or size of set to be entered. A description of the work done will be considered an important part of the entry. The critical element is the appearance of the radio, including woodwork, escutcheons, dials, knobs and other visual details

24. RESTORATION OF OPERATION

This is the category for those craftsmen who artfully substitute modern components for old failures. The new electrolytic in the old can is an excellent example. Another is the transistorized tube. Perhaps the replacement of pot-metal parts by silver-gray-colored epoxy castings has been accomplished by one of us. If so, please bring in the set that incorporates that restoration. Entries should be accompanied by documentation showing how your update preserves the quality of the original.

25. NEW OR REBUILT

Previously we have encouraged entries that showed the conference attendees how substitutions and reconstructions would provide vital parts or pieces. We also encouraged craftsmen

who had made an old function come alive again to bring their work for review.

Do you remember the Federal receiver and the operating Marconi coherer detector that were entered in previous contests? We want to continue that tradition so bring in your retrospective designs and your reconstructions. There is no requirement for particular devices or circuits.

THE CONTEST AWARDS

Elle Craftsman

Given in memory of Bruce Elle to a builder of a high-quality radio receiver of an old or new type.

Matlack Transmitter

Given for excellence in constructing or restoring transmitting equipment.

Ralph O. Williams Display

Recognizes the informational value and quality of an exhibit in the contest at the AWA conference.

Thompson Best of Show

Awarded in honor of early amateur Eunice Thompson, W1MPP, for the top entry in the Old Equipment Contest at the Annual Conference.

People's Choice

Awarded to the entry that receives the most favorable votes from attendees and visitors to the contest. All entries including displays are eligible for this award.

RADIO REPRODUCERS, continued from page 24

The reproducer for the Octagon Senior is riveted or bolted to metal supports that cross the inside of the speaker. The Junior reproducer, slightly smaller, is attached to a metal-and-cardboard frame that was secured as the parts of the speaker frame were pressed together during manufacture.

The reproducer magnets (four in the Seniors; two in the Junior) were specially constructed to help support the balanced armature and the elliptically-shaped single coil. DC coil resistance is approximately 925 ohms in all types.

Most mid-1920s speakers were equipped with flexible tinsel wire cords, but the cords on the Sonochorde units have rubber-covered stranded copper leads under a cloth outer cover. Over the

years the rubber insulation has become very hard and inflexible, making it almost impossible to bend without breaking the rubber and shorting the conductors. However, the Sonochorde line is free of the "pot metal" problems that plague many other speakers of the era.

Because of their unique and colorful design, these attractive speakers are an enhancement to any collection. For further information regarding the Sonochorde speakers as well as many other 1920s brands, please reference *Classic Cones Pictorial Reference and Value Guide for 1920s Radio Cone Speakers*, by Buford and Jane Chidester, published by Sonoran Publishing LLC, Chandler AZ. 

RADIO REPRODUCERS

EDITED BY **DAVE CROCKER**, 35 SANTUIT POND RD., #4B, MASHPEE, MA 02649
PLEASE INCLUDE SASE FOR REPLY.

Boudette Manufacturing Co: The Sonochorde Family of Cone Speakers

By *Buford Chidester*

785 Locust St., Mount Wolf, PA 17347

The mid 1920s was a very competitive time for radio manufacturers, and cone speakers were no exception. Various types and styles were being produced, with their makers vying to develop the most unique and cost effective designs.

The Boudette Manufacturing Co. of Chelsea, Massachusetts was a very strong competitor in this industry. They produced, and heavily advertised, the Sonochorde family of speakers — including the 18" Octagon Senior, the 14" Round Junior and the round, open style, 17" Senior.

Both the Octagon Senior and Round Junior had stamped-metal cases fitted with exposed-back-mounted, pie-design, wood-grain paper cones. Cones for the Octagon Senior and Round Junior were protected by a metal shroud with cutouts. The Octagon Senior can be found as a table model, mounted on a floor stand, or with a cord and tassel for wall hanging.

The Round Senior is very delicate and has a cast aluminum frame. Its cone is completely open, without protection. It is interesting to note that the Round Senior is labeled as being manufactured in Revere, Massachusetts, whereas all other Sonochorde speakers carried Chelsea, Massachusetts labels.

Various colors were used to highlight the speaker design.

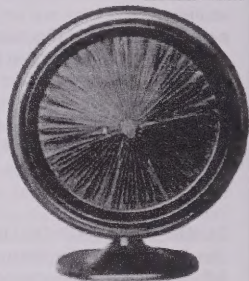
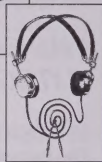
The front of the speakers have a pleated silk dust cover that is either wine or bronze/gold in color. The Octagon Senior case came in a smooth mahogany or wrinkled gold finish; the Junior was offered in a smooth finish only. The Round Senior frame was finished in crinkle gold and black.

After many years of exposure to the elements, most of the mahogany finishes have become very dark—almost black. The bronze/gold finishes usually retain some of their original color.

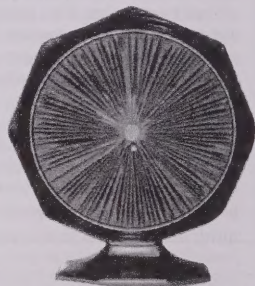
All Sonochorde speakers have a unique reproducer. The unit, specially made for these speakers, is fitted with a mechanical volume control that protrudes through the front silk cover. The wine-colored Octagon Senior and round Junior have a brass octagon knob for volume adjustment. Those with bronze/gold fabric have a knurled cylindrical control.

Octagon Senior on stand.

(continued on page 23)



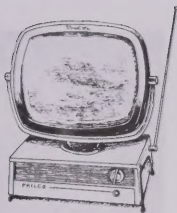
Front view of Round Junior. Back shroud (not shown) has cutouts similar to those on back of Octagon Senior.



Front and back views of the Octagon Senior.

TELEVISION

EDITED BY **RICHARD BREWSTER**, 145 LITTLE PECONIC BAY ROAD,
CUTCHOGUE, NY 11935 PLEASE INCLUDE SASE FOR REPLY.



Restoring a British HMV 904: Part 2 — The Procedure

By Hugo Holden

In the February TV column, Hugo Holden described the 1939 HMV 904 British television receiver and provided some interesting background information. Now you will find out the details of his restoration of the set.

As-Found Condition

The set had a number of fairly severe problems when it came into my hands. The CRT (an Emiscope 3/1) was missing; there was extensive chassis rusting that included everything that was made of steel (mechanical parts, screws, bulb sockets, small brackets, etc.); there was moderate corrosion of all the aluminum parts; the wiring was disintegrating and in some places the insulation had actually turned to powder—a reminder of just how old this set was; every capacitor was leaky or open.

Some of the resistors were still ok as were, fortunately, all the important parts such as the RF coils, IF transformers and power transform-

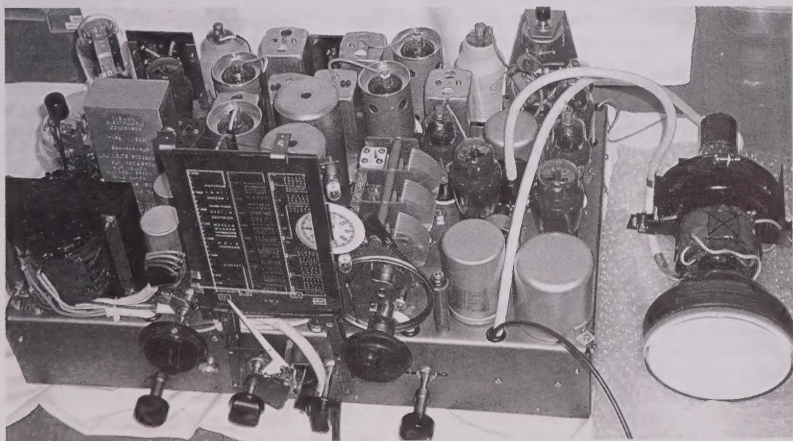
ers (Incredible!). The main dial was in good order but the vernier dial was very rusty with flaky paint. The cabinet would require complete refinishing.

Tracing the Wiring

Restoration began with documentation of the chassis wiring. Since the set is a combination TV and multi-band radio, the switching is enormously involved and the wiring and component placement is very crowded. It took almost two days to accurately document the wiring in the rotary switch areas and multi winding coils.

Mechanical Restoration

The set was now stripped down completely. The chassis, brackets, multiple rusted mechanical parts, including the variable capacitor frame (from the radio section) and bulb sockets were all fine-bead blasted to remove all traces of rust, then plated using the "electro-less nickel" process. I have a preference for this process because it plates into corners and down holes, so is



The HMV 904 upon completion of the meticulous restoration.

AUTHOR'S ADDRESS: P.O. BOX 918, MAROOCHYDORE, 4558, QUEENSLAND, AUSTRALIA



A sample of the remarkable reception quality provided by this circa 1939 classic TV.

excellent for complex shaped objects. It has a great satin silver metallic look to it, resembling the original plating, and has excellent longevity. This can be further improved with a coat of clear lacquer.

It was not practical to re-plate the hundreds of rusty screws in this set. New ones of identical geometry and thread size were readily available. The aluminum components were polished and lacquered for protection. The tube shields, a composite of steel and alloy, were treated with rust converter and ultimately—after a lot of preparation—painted with fine silver lacquer. The yoke and focus coil assembly were also electroplated, but were then painted with black lacquer to match their original finish.

I scanned the markings on the vernier dial before replating and repainting it. Then I doctored the image using Photo Studio software and printed out a replacement scale to apply to the restored dial assembly.

Electrical Restoration

The electrolytics were replaced and the wax paper capacitors rebuilt with new caps placed inside and the ends sealed with polyester resin. The large high-voltage filter cap was also rebuilt. The original tube sockets were badly corroded and beyond restoration, so I replaced them all with high quality ceramic sockets that, after a lot of hunting, turned up in the UK. Finally the set was re-assembled using the original under-chassis layout and original tag-boards with the rebuilt capacitors and the many new resistors (a few of the originals were still okay). A set of NOS tubes, again purchased in the UK, were fitted.

A replacement emiscop 3/1 CRT could not be found. One fellow in the UK told me he had been looking for one since the late 1950s with no luck. Steve McVoy of the Early Television Foundation suggested a 5FP4. This is a magnetically deflected, magnetically focused tube that was designed post-war by RCA for the viewfinder on the TK30 camera. The radar version of this tube (5FP7) dates from 1942.

I located some 5FP4s and started testing. The neck on the 5FP4 is a little larger than the 3/1, but removal of a small amount of cardboard from the center of the yoke

allowed it to just slip over the neck of a 5FP4. The tube proved to be an excellent substitute CRT. The tube specs suggest a minimum high voltage of 4000V. But I have had no difficulty running it on the 2400V in the HMV 904.

Electrical Alignment

Following the manufacturer's advice I set up the RF, oscillator and IF stages—first in the radio section and then in the television. The television IFs are not as sophisticated as those in the Andrea or Meissner I had previously restored. Due to the sound and vision IF being common there is interaction between the two and when one is adjusted the other must also be reset.

After completing the alignment I swept the IF in the usual way and, much to my astonishment, found that the video IF bandwidth was only 1.4 MHz. Despite this the screen image was acceptable. With a few minor adjustments, and the use of the sweep generator I was able, without any modifications, to increase the bandwidth to 2.4 MHz. This substantially improved the picture detail.

It also became obvious right away that the magnetically focused 5FP4 is superior to both the 5BP4 and 5AP4 used, respectively, in the previously-restored Meissner and Andrea sets. The latter tubes lose focus as the beam intensity increases or is varied. This is due to the influence of the grid voltage on the beam and changing relative potential with respect to the focus electrode.

The 5FP4, on the other hand, maintains excellent focus at all beam intensities. As the set warms up, however, the focus coil current changes and requires occasional re-adjustment of the front-panel focus knob. I don't think constant current

sources were on people's minds back then.

Results

The overall performance of both the radio and TV sections of the 904 is very good. The CRT image is quite acceptable, despite the relatively low bandwidth, primarily because on a 5" CRT the lower resolution is not as noticeable. The benefits of magnetic focus are obvious, so despite the poorer IF bandwidth compared to the Andrea and Meissner, the overall picture is comparable over a range of contrast settings on the three sets.

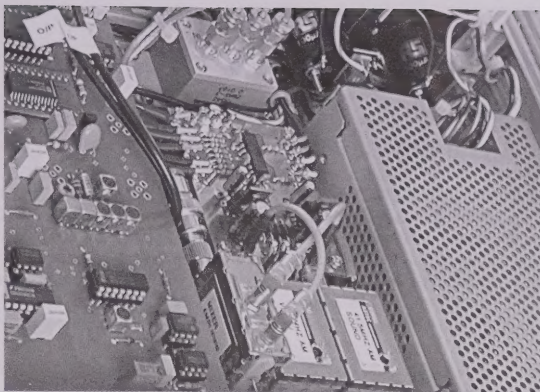
The sound on the 904 is very impressive. These prewar TV sets have a relatively wide bandwidth in the sound channel compared to standard AM transmissions on medium or short-wave. The audio quality to me is indistinguishable from FM sound in modern sets. The effect is enhanced by the usual class A audio output stage and the 904's good-sized wooden cabinet and six-inch PM speaker.

Design Analysis

I have no doubt that the 904's deflection coil, focus coil and line output transformer would have been more expensive to produce than components required for electrostatic deflection. This may have been compensated for, a little, by the simpler magnetically deflected CRT. The 5AP4 and 5BP4 CRTs with their more elaborate gun structures probably cost more than the emiscope 3/1 or the 5FP4 to produce (though probably not by a great deal).

Ultimately magnetic deflection was to win out over electrostatic deflection. Primarily this was due to the difficulties of acquiring high enough linear saw-tooth voltages as the high voltage was increased for larger tubes. Linear amplifiers producing them would themselves have to run off very high voltages. In electrostatic deflection the amount of deflection is inversely proportional to the final anode voltage. So if you double the voltage you need double the deflection voltage for the same width/height.

In magnetic deflection the amount of deflection is inversely proportional to the square root of the high voltage ref(2). So if you double the voltage then you only require a 1.41 increase in



A glimpse inside author's standards converter, which provides 405-line video pictures from a modern 625-line signal.

the deflection current for the same width/height.

Finally one cannot be unimpressed by the level that television technology had reached by 1939. Viewing programs on these sets is an experience not a great deal different from observing them on any black and white television manufactured decades later.

405 Line Source

Vintage television collecting is becoming quite popular in the UK, and a few talented people have turned their hands to making standards converters so that current video pictures can be viewed on vintage sets. These receive a 625-line video source, digitize it, and download it to memory. The signal is then read out at the lower 10,125 Hz line rate.

I acquired a standards convertor as a set of circuit boards from David Grant, an exceptional electronics design engineer in the UK. I designed and built my own modulators, modifying some existing Aztec units and providing appropriate clamping and polarity inversion for the video. In addition a mixer amplifier and mini circuits RF attenuator was used to control the RF levels.

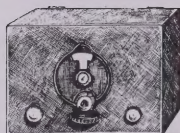
The resulting unit effectively recreates the signals generated by the original Alexandra Palace transmitter. It can provide up to 14 mV rms RF out into 75 ohms, but in practice 3mV is a suitable level for the 904. 

REFERENCE

(2) *Basic Television*, Second Edition, Grob. McGraw-Hill Book Company, Inc. NY, 1954. pg 48.

AMATEUR RADIO

EDITED BY **JOHN F. ROLLINS, W1FPZ**, HC 33, BOX 150, ARROWSIC, MAINE 04530
PLEASE INCLUDE SASE FOR REPLY.



Results of the 2003 Linc Cundall Memorial Old Time Contest

This year's Linc Cundall Memorial Contest was again held the last week in January (Jan. 22-23 and Jan. 25-26). On the whole conditions seemed to be quite favorable across the country. The only serious shortcoming was the contest event on 160 meters, held Saturday-Sunday. One would have to have been pretty determined to compete with that high power activity. This contest may be an annual event. In order to improve our activity, and success, on 160 meters I am considering several possibilities. More on that later in the year.

Participation in the Linc Cundall Contest was down again this year, which is disappointing. There were a total of only 45 logs returned. We continue to have a few new contestants and several of them are already serious contenders. First-time tester Bob, WZV DX, turned in a third place score. First timer Harold, KB0ROB, made the top ten score box using a 210 Hartley. First timer Ron, W0NYQ, turned in a very respectable log using a type 30 regen detector, 30 audio, receiver. WOW! Welcome.

One new participant on 20 and 40 meters was Sven, SN4DIG, with 9 QSOs. He heard many AWA calls but most did not respond—probably because no one was expecting him. We shall put out a reminder next year to watch for Sven.

Veteran AWA Old-Time tester Parker,

W1YG, racked up a phenomenal score of 960 points for first place. He had not been on for the last couple of years, but it certainly didn't dull his response! Congratulations.

Looking ahead to the next Linc Cundall Contest: the dates (last week in January) and band segments will probably stay the same. It is getting harder and harder to find clear space where we don't have to compete with a high powered contest of one type or another.

So, 73 to all and I hope to see you all on the next test. Thanks for the nice notes sent in with your logs.

TOP TEN SCORES

CALL	POINTS	CALL	POINTS
W1YG	996	AC5AM	270
W3HWT	330	KB0ROB	270
W2VDX	288	VE3DKW	261
W1DDW	285	W9POC	243
W5WS/3	279	W6DJX	216
		K2LP	196

TOTAL QSOs BY BAND

BAND	160	80	40	20
TOTAL QSOs	35	567	236	44

COMPLETE CONTEST RESULTS

CALL	TX	QSOs/Band				Total Points
		160	80	40	20	
W-1						
NE1S	'34 PP TNT					
	'37 TRI-TET		10	7		135
W1TSP	MOD		7	1	3	50
W1DDW	'42 ARC-5 2	24	5		285	
W1YG	'38 MEISSNER S.S.	10	45	20	4	996
K1FI	'27 MOPA, MOD		8	10	2	104
K1GDH	MOD		3	4	2	30
W1NV	'29 HARTLEY, MOD	1	2	2	1	36
W1GIG	'38 MEISSNER		12			117
W1NZR	'43 TC5, BC653	2	4	10		108
W1FPZ	'29 COLPITTS,					
	'38 VFO 46-TZ-20		9	17	1	174
AJ1G	'43 TCS-12	1	13	2		107

CALL	TX	QSOs/Band				Total Points
		160	80	40	20	
W-2						
AA2CU	'45 BC696	7			42	
KB2PLW	'38 6L6 XTAL		21	11		246
KE20	'29 TNT		11			88
N2VO	'45 XTAL 3C24		12			117
W2HBE	'29 HARTLEY 245		12			72
W2VDX	'39 ECO					
	6AC7, 6AC7, 807		22	10		288
W2CQH	MOD		8			18
K2KK	'37 XTAL 6V6-6V6			8		48
KB2E	'46 32V1		15			86
W2RS	'41 MEISSNER S.S.		6			36
AI2Q	'38 XTAL					
	6L6 COLPITTS		10	8		162
K2LP	'39 ECO 6L6-807-860		29	8	3	196
W-3						
WB3HLH	'41 XTAL 6V6-6V6		13	10		207
W5WS/3	'38 6L6PA, MOD	2	27	17	2	279
W3MNE	MOD		25	11		108
W3HWT	'26 HARTLEY,					
	'40 HT-6	5	19			330
W3VVS	MOD		1			2
W-4						
W4VBX	'38 ECO					
	6K7-6K7-6V6-6L6		6	2		72
AA4RM	'41 STANCOR 69,					
	'43 TCS		9	3		84
W-5						
AC5AM	'38 HARTLEY 807	1	11	7		270
K5CF	MOD		7			20
K5RB	MOD	2	13	6	6	123
W-6						
W6DJX	'43 ARC-5,					
	BC-696, BC-459	1	13	5		216
W6TOP	'37 UTAH UAT-1		2	2	3	32
K6TQ	'38 6L6-807				4	63
W-7						
W7LOG	'44 ARC-5	4			24	
W7LNG	'43 MEISSNER S.S.		2	2	4	60
W7DRA	'43 ARC-5,					
	'29 211 TNT	1	2	1		21
W-8						
W8ZNX	'36 JONES 6A6					
	'46 MOPA		12		1	141
W8KGI	'42 BC-459, BC455					
	BC-453			5		42
WD80FB	'37 6L6 OSC.		5	1		24
W-9						
N9TT	'41 211 MOPA	2	2			15
W9POC	'40 6V6-6L6-807		20	9	1	243
AA9DH	MOD		3	3		68

CALL	TX	QSOs/Band			Total Points	
		160	80	40		20
W-0						
KB0ROB	'34 HARTLEY 210		20	2	270	
W0VLZ	'39 6J5-6L6		1	2	27	
W00G	MOD	5	14	2	110	
W0NYQ	'41 MEISSNER S.S.		8	5	153	
VE						
VE3DKW	'45 BC-696,					
	'45 BC-459		17	9	261	
VA3HN	MOD, '46		6	1	22	
VE3BHW	MOD		8	1	36	
VA3RSA	MOD		7	5	48	
SM						
SM4DIG	MOD			2	7	81
TOTAL OF 45 PARTICIPANTS						

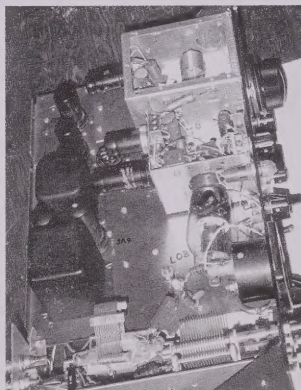
Results of the 2003 "30s Night" Get-Together

By Marc Ellis, N9EWJ

In a way I feel I'm sailing under false colors to be presenting this report. Though I originally proposed this 30s get-together, I'm an inactive ham and had to rely on Randy Haus, KB2PLW, who is the brains of this team, to design a credible set of contest rules, frequencies, etc. I volunteered to do the secretarial work, and that's all I'm in a position to do pending my transition to active hamhood again.

As you'll see from the report below, we drew twenty-one participants. And though most reported relatively few contacts, the many interesting notes received with the logs indicated that everyone had a pretty good time and would like to see this event back next year.

As far as I can see from the logs and other communications, only two participants went after the AM operating opportunity offered in the rules. They both sent pictures of their rigs, which I'm including with this report. Since this is the



A peek down at the top of the W2VDX AM rig. 807 final is modulated by a pair of 6V6s. Covers removed from VFO and buffer multiplier compartments. Power supply is on separate chassis.

first AWA contest with an AM operating category, we thought we might do better. Hmmm—maybe Randy will offer better inducements in next year's rules.

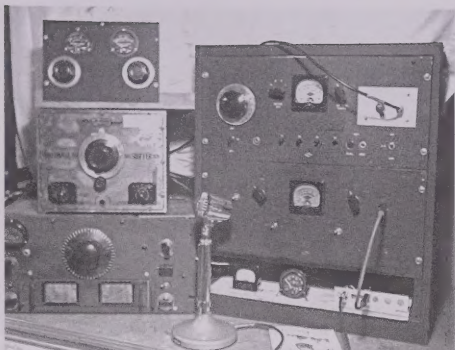
The two participants were Bob, W2VDX, who built a special 1930s-era, 160-20, 25-watt, AM/CW transmitter for the occasion. He wasn't able to make any AM contacts this time, but you'll be hearing the rig on the AM nets. Ex AWA President Bill Fizette, W2DGB, rehabbed a rare 1930s National NTX30 with accessory NSM modulator. He did make one AM contact—with an AWA member who had forgotten about the contest and just happened to be on with some vintage equipment. Well we won't quibble! Since Bill

seems to have made the only AM contact we'll give him the 18 points anyway.

Bob, AA9DH, built his rig on a partially-wired chassis he thinks came from the W9GYS estate sale. It seemed to be set up for the 6L6 ECO rig

from the 1938 *Handbook* (p. 179), so he just went ahead and finished the job. Sven, SM4DIG, found 40 meters either dead or with heavy QRM. He did manage to work a couple of AWA-ers on 20. Harry, N9CQX, was rockbound, as was appropriate for the 30s era. But he found that most participants were not observing 30s tuning etiquette, but listening for answers only on their own frequencies. Remember those long crystal-control CQ's, ending in something like "... and tuning the band from the high end down?"

Martin, WA3WMF, built a special rig for the event (which was his first AWA contest). He made only one QSO, but enjoyed it thoroughly and will be back next year. Bud, W7LNG, built a replica of his first (1936-era) rig—a 6L6 tri-tet. Another rig specially built for "30s night" was Howard's (WB2AWQ) "emergency/portable transmitter" from the August, 1939 QST. Accidentally using a coupling capacitor of the wrong value, he snapped what he thought was his only 80-meter crystal. Luckily he was able to scrounge



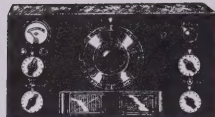
W2DGB's contest AM station. National NTX30 Xmtr and NSM modulator are in rack at right. 1938 Meissner Signal Shifter and an antenna tuner sit atop National HRO at left.

up a 3716 kHz rock the day before the party.

Jim, W8KGI, was all set to go on with the 6J5/6L6 transmitter and HRO that had been used together in the 1930s by Bob Higgy, W8IB. A last-minute business trip kept him off the air though. Hope to see you next time, Jim!

Station	Points	TX	RX
W1DDW	72	1938 MOPA 801-805	Mod
K1FI	9	Mod (KWM-380)	Mod (HRO 5TA1)
W1FPZ	36	1938 ECO	Mod (75A-4)
		46-TZ20-T-55	
W1YG	252	1938 Meissner Signal Shifter	1938 Hammarlund HQ-120
WB2AWQ	266	1939 6L6-6L6	1932 Lamb Superhet
W2DGB	18	'38-'39 Nat. NTX30 + Nat. NSM modulator	'38-'39 HRO
W2LID	15	Mod	Mod
KE2O	4	Mod	Mod
KB2PLW	6	1938	Mod
W2VDX	108	1939 homebrew AM/CW rig	Mod (Hammarlund HQ-129X)
N2VO	84	1938 homebrew 6V6 Pierce-6L6-807	Mod (RCA AR-88)
WA3WMF	27	1936 6L6 1-tube	1936 HRO
AA4R	60	39 Collins TCS	39 Collins TCS
W7LNG	57	1936 6L6 tri-tet	Hali S20R + Mod
K8NI	9	Mod	Mod
N9CQX	22	1936 homebrew rig 42 osc to pp 6A6s	1936 National NC-100
AA9DH	27	1938 <i>Handbook</i> rig 6L6 ECO	1938 HRO
N9TT	9	1939 BC-375	1937 BC-312
KB0ROB	102	10-6L6 MOPA	Mod (Hali SX117)
VE3DKW	150	Mod (BC696 + BC457)	1939 HRO
SM4DIG	24	Mod (Hali HT37)	1938 HRO

THE COMMUNICATIONS RECEIVER



EDITED BY **WILLIAM FIZETTE, W2DGB**, RR 1, BOX 55, HENRYVILLE, PA 18332
PLEASE INCLUDE SASE FOR REPLY.

The 1945 Hammarlund HQ-129X

By *Jim Hanlon, W8KGI*

Author Jim Hanlon returns once more to our pages, this time to review an all-time favorite receiver of amateurs during the immediate post-WW II time frame, the Hammarlund Manufacturing Company HQ-129X. Those who have studied and used the Hammarlund receivers of the 1930s and 40s don't have to be convinced of the quality built into those products. Routine restoration work on one of these sets that is in decent shape to start will result in a pleasing working addition to any ham or SWL station. The exercise is highly recommended.—W2DGB

One of my favorite old-time receivers is the Hammarlund HQ-129X. I have two in my collection at the moment, at least one more than I really need, but they were both gifts and I wouldn't deny an old friend a good home.

My first encounter with an HQ-129X was in the radio club at Saint Xavier High School in Cincinnati. Our original receiver was a Hallicrafters SX-43, not a bad performer but too much of a lightweight for the high shock and vibration environment created by a group of teen-age boys. It would literally bounce off-frequency when some of the guys were horsing around in our back-of-the-physics-lab radio shack.

In the fall of 1951, our club moderator, Jesuit scholastic Tom Gideon, convinced his parents to donate a brand new HQ-129X to our club. This was a much more solid, substantial radio, and it served old W8GYH well for many years thereafter.

The HQ-129X is the second member of a family that began with the HQ-120X in 1938. Its brothers include the HQ-140X, HQ-150, HQ-160 and HQ-180. All of these radios share the same "front-end" design. They cover the 550 kHz to 30-MHz range in six bands, and they have calibrated bandspread for the 80, 40, 20 and

10-meter bands; the later production runs also included the 15-meter band.

These receivers have special, nine-section bandspread and six-section main tuning capacitors, as opposed to the three-section capacitors that are found in their National, Hallicrafters and RME counterparts. The capacitor sections are sized and switched in to optimize the tuning span on each of the traditional 80, 40, 20 and 10 meter bands that were available when the HQ-120X was designed in the late 1930s, spreading each band over almost the full dial. (The general coverage ranges are 540 to 1320 kHz, 1.32 to 3.2 MHz, 3.2 to 5.7 MHz, 5.7 to 10 MHz, 10 to 18 MHz, and 18 to 31 MHz.)

The capacitors are also designed so that the rotor plates are centered in the stator assembly, and with materials such that capacitance change due to thermal expansion is minimized. This minimizes frequency drift due to warm-up and ambient temperature changes.

An overview of the "family" shows that the HQ-120X through the HQ-150 are single-conversion superhets with one RF amplifier, three 455-kHz IF amplifiers, a crystal filter between the first and second IF stage, a noise limiter, and a modest level of audio output (three watts from a 6V6 in the HQ-129X.) The original, pre-war HQ-120X was designed with "double-ended" 6S7 tubes in the RF and IF amplifiers, while the post war HQ-129X went to "single-ended" 6SS7 tubes (no plate caps; all the leads come out the base).

The HQ-140 used miniature tubes, including a higher gain 6BA6 as the RF amplifier and a lower noise 6BE6 mixer. The HQ-150 added an IF Q-multiplier to the package. The HQ-160 went to dual conversion above 10 MHz, with a 3055 kHz first IF. The HQ-180 lost the 455-kHz crystal filter but added a 60-kHz third IF with variable bandwidth and a product detector to top out the family line. Even the most recent receiver

AUTHOR'S ADDRESS: P.O. BOX 581, SANDIA PARK, NM 87047

in the line, the HQ-180, is instantly recognizable as a member of the family with its two tuning knobs and dials and its six-position bandswitch.

Those three IF amplifiers in the HQ-129X deserve some special mention. Where the competition used two IF amplifiers with a total of six tuned circuits for selectivity at 455 kHz, the HQ-129X added a third stage with its additional IF transformer for a total of eight tuned circuits. As a result, the Hammarlund has noticeably better skirt selectivity. That's the good news.

The bad news is that while the IF alignment on competing receivers is accomplished just by peaking all of the transformer adjustments at a single frequency, aligning an HQ-129X properly requires using a sweep generator and an oscilloscope to adjust the passband for the best gain and skirt fall-off. Those who want to be real HQ-129X mechanics might be interested in the simple IF sweep generator that I recently built, and which will be described in a forthcoming issue of *Electric Radio* magazine.

In addition to good skirt selectivity, the HQ-129X also has a top-notch crystal filter. As the selectivity curves show, with the crystal filter out the IF bandwidth is about 6.5 kHz at 6 dB down and 9.6 kHz at 20 dB down, just right for amateur AM phone in an uncrowded band but perhaps a little too narrow if you are looking for

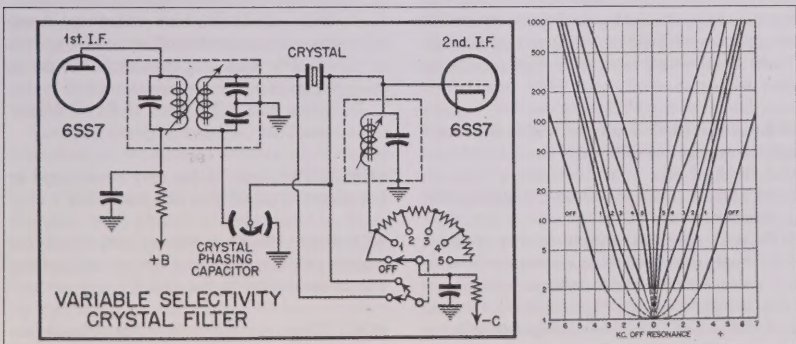


The HQ-129X. Tuning knobs are not original.

"high fidelity" reception on medium- or short-wave broadcast. Crystal positions 1, 2 and 3 sharpen the 6-dB bandwidth to about 3.8, 2.4 and 1.5 kHz respectively, or to 6.5, 5.6 and 4.6 kHz for the 20 dB-down points. These would all have been quite useful in those days in pulling a phone signal out of increasing interference. Positions 4 and 5 yield 20 dB bandwidths of 2 and 1 kHz respectively, ideal for CW operation.

By my best estimate, using a Boonton Measurements Model 80 signal generator with a calibrated variable attenuator on its output, the crystal phasing notch rejects a signal one kHz away from the center frequency by 86 dB! So it is not surprising that the HQ-129X was a well-respected receiver in its day by both AM phone and CW operators.

The tube line-up in the HQ-129X consists of a 6SS7 RF amplifier, 6K8 converter (both mixer and local oscillator), three 6SS7 IF amplifiers, (continued on page 35)



Crystal filter circuit and selectivity curves of the HQ-129X, taken from the original manual. Phasing notch not shown.

THE VACUUM TUBE

EDITED BY **LUDWELL A. SIBLEY**, 102 MCDONOUGH RD., GOLD HILL, OR 97525-9626

PLEASE INCLUDE SASE FOR REPLY. COPYRIGHT © 2003 LUDWELL A. SIBLEY.



Tube Salvage Schedules

The manufacture of tubes, while nominally a controlled process, was subject to unavoidable variations in dimensions of parts and assembly techniques. The result: some completed tubes failed to meet their test requirements. The transconductance was too high or too low; the emission was out of spec; a dual-section tube might have wide differences between the sections; etc.

Yet the rejects (or "shrinkage") could sometimes be rescued. RCA, and presumably the other makers, had ways to rework unsatisfactory tubes, often by, well, whacking them. The following excerpts from "Tube Salvage Schedules" (RCA Standardizing Notice 23-6-1, issues from 1947 to 1962) show the point in regard to specific tube types.

The following quoted *Standardizing Notices* are in the Dowd-RCA Archive, a resource of the AWA Museum.

2A3. Low plate current shrinkage may be salvaged by tapping tubes with hard felt hammer as follows. Tap tube on dome in a plane parallel to the top mica while the AC test procedure has been interrupted. Tubes so processed must fall within the zone limits for plate current.

6AG7. Tubes rejected initially for high plate current may be reclaimed by tapping (when cathode is hot) against a padded or soft surface or edge. Tubes so processed must fall within zone limits after tapping.

6CL6, 2014, 6197. Electrical rejects for cut-off may be salvaged as follows:

- Preheat at $E_f = 7.0$ V (3 min.).
- Test set $E_f 7.0$ V. All other conditions the same.
- With tube in the plate-current position, bump tube (with fibre tapper) on the same side as Pins 1 and 9 or 4 and 5, whichever shows a reduction in plate current. Then test for cut-off. All tubes must be retested...

6E5, 6U5/6G5, 1629. Tubes which do not meet the spec. for opening and closing of the eye pat-

tern during cut-off test may be salvaged by tapping the dome of the tube with a hard felt hammer in a plane parallel to flat of the electrode. This changes the spacing between the edge of electrode and the lateral wires of the target grid which is critical to cut-off.

6F4. Reclaim 6F4 rejects which conform to the 6L4 M[aster] S[pecification] S[heet]. Only factory tests to be made. 100% grid-plate capacitance test is necessary. The number of 6F4 tubes reclaimed per month as 6L4 tubes must not exceed 15% of the actual number of monthly 6L4 shipments. No selections of 6L4 tubes from 6F4 rejects may be made during unsatisfactory 6F4 life test periods. CAUTION — change bulb etch on any tubes reclaimed.

6J5GT, 12J5GT. Low-plate-current shrinkage (below factory limit) may be salvaged by bumping with the flat of the plate horizontal to a hard surface.

6J7, 1620. Electrical rejects for high plate current and cut-off may be salvaged as follows:

- Preheat at $E_f = 8.0$ V.
- Test under same conditions as I_{b0} and Col_b [i. e., zero-bias plate current and cut-off plate current] except with $E_f = 8.0$ V.
- With cathode hot (from preheating), bump tubes on same side as Pins 1 and 8, or Pins 4 and 5, depending on which side shows the greater improvement.
- Retest tube at $E_f = 6.3$ V for all factory tests.

6K6GT. High cutoff tubes may be salvaged by bumping to a cutoff limit of 1.6 or better.

6K8, 12K8, 12K8Y. Tubes rejected initially for high and low I_{c1} , I_{c2} , and S_c [transconductance] may be reclaimed [as for 6AG7].

6L6G. Tubes rejected for high plate current may be reclaimed by bumping on a soft surface while cathode is hot. The [y] must be factory-tested twice and quality-tested before shipment to warehouse.

6SH7, 12SH7. Tubes rejected initially for high plate current and high transconductance may be reclaimed [as for 6AG7].

6X5GT. When emission shrinkage is due to spacing (i. e., one side reads high and the other low), bump the tubes in a direction which will correct the spacing.

25L6GT, 35L6GT, 50L6GT. Plate current shrinkage may be salvaged by bumping the tubes.

49. Salvage high and low plate current rejects by tapping the tube lightly on a flat surface.

117N7GT, 117P7GT. Plate-current shrinkage and/or cathode-voltage shrinkage may be salvaged by bumping the tubes. Bumped tubes are to be tested and then unpacked for regular testing.

884. If the tube conducts during either #1 or #3 Gr. Ch., the cathode should be bumped *away* from the grid slot. If the tube conducts during either #2 or #4 Gr. Ch., the cathode should be bumped *towards* the grid slot.

1658. Tubes rejected on initial testing for high or low plate current may be reclaimed by tapping [as for 6AG7].

2050. Electrical rejects of type 2050 are to be

retested at type 2051 conditions and shipped as type 2051 if all tests are passed. CAUTION — change bulb etch on any tubes reclaimed.

5693. Electrical rejects for cut-off may be salvaged as follows:

A. Preheat at $E_f = 8.0$ V (5 minutes max.)

B. Test under same conditions as for 1 CO₁b except with $E_f = 8.0$ V.

C. Bump tube on same side as Pins 1 and 8 or 4 and 5, depending on which side shows an improvement in 1 CO₁b. Good tubes after bumping must pass a maximum limit of 100 μ A. All bumped tubes must be given the regular 48 hrs. stabilizing aging before final testing.

7551, 7558. Electrical rejects for cut-off may be salvaged as follows.

A. Preheater and test set at regular voltages.

B. [B]ump [as for 6CL6].

Tubes with Metal Shell-Wafer Bases. For open ground lead or wrong threading: decrimp the shell, heat solder on pins and remove wafer. Place ground lead in proper pin of new wafer and thread tube leads into wafer. Crimp the shell with a hand crimper. The ground lead is positioned between the wafer and the shell at the point of crimping. Cut off excess ground lead and solder the pins. ☑

COMMUNICATIONS RECEIVER, continued from page 33

6H6 detector, AVC, and noise limiter, 6SN7 first audio amplifier and S-meter amplifier, 6V6 audio output, 6SJ7 bfo, a 5U4 rectifier and a VR105 voltage regulator. The combination of the relatively low gain 6SS7 RF amplifier with the high noise 6K8 converter creates a situation in which the internal front-end noise in the receiver dominates antenna noise in a quiet location above about 15 MHz.

I can just barely hear a peak in antenna noise when I adjust the antenna trimmer on 10 meters at my country location in New Mexico. This didn't bother us at all at W8GYH, where the abundant noise sources in downtown Cincinnati still rode well above the front-end noise and the weak signals, all the way up to 30 MHz. But the barefoot HQ-129X is definitely not the sensitivity champion on 20, 15 and 10 meters when compared to its contemporary competitors like the National NC-173 with its 6SG7/6SA7 front end, the RME-45 with its Loktal 7B7/7J7, or the Hallicrafters SX-43 with its 6BA6/7F8.

Even with this relative disadvantage, which was often cured with the addition of an outboard RF preselector, the desirable features of the HQ-129X made it the most popular receiver in its \$180 price class in the immediate post-war era. That's why you see more HQ-129Xs in flea markets these days than all of its National, Hallicrafters and RME competitors combined. (*The price in 1946 was set at \$129 as a marketing ploy. Unfortunately, Hammarlund found that they could not sustain this low price, and by 1953, at the end of production, the set sold for \$239. Ed.*)

I use my HQ-129X regularly on the Classic Exchange and the AWA amateur radio events. It is stable, selective, adequately sensitive on 20 meters and below, and it is mechanically solid as a rock. It is as much fun to use today as it was back in my 1952-to-1956 stint at W8GYH, and I would thoroughly recommend an HQ-129X or any of its family members to an OTB reader as a good, highly-functional addition to your collection. ☑

THE ALEXANDERSON ALTERNATORS AT HAIKU

During the time that I was in the Navy, I was assigned, to the U.S. Naval Communication Station at Haiku, Hawaii, from August 24, 1953 to February 21, 1955. Haiku was a very low frequency (VLF) station operating at 16 Kilohertz (yes, Kilohertz, not Megahertz). It was located near the town of Kaneohe on the opposite side of Oahu from Pearl Harbor and in a mountain valley. It was built in a hurry during World War II. The construction of the antenna system is described in *Builders for Battle* by David O. Woodbury, (E. P. Dutton and Co., 1946). An Alexanderson alternator was installed in the station originally, and a second one was added after the war.

The main use of the station was to communicate with submarines. The VLF signal would propagate so well through salt water that a sub could receive it while submerged. Once a submarine radioed that they were picking up our signal fine while submerged 150 ft under the Mediterranean, on nearly the opposite side of the Earth. Sea water is essentially a loss-free dielec-

tric at these low frequencies.

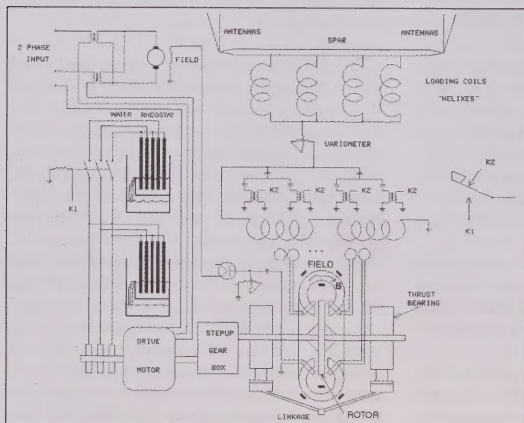
The antenna system at Haiku consisted of five cables that were strung between mountaintops. These cables were each two miles long and 2200 feet high over the valley at the ends. The cables were only 1800 high at the center because of their 400-foot sag. Access to the mountain tops from the valley floor was by cage-enclosed cable car.

At one antenna end, a single rudimentary cable car, little more than an open box supported from a single wheel by a rod system, went up 300 feet further to the "Sky Room." This was a concrete shed containing the VHF link equipment to Pearl, which was used in case the phone lines keying the transmitters failed. When riding this car, one had to sit on the edge of this box, hold on to the rods for support, and not look down.

There was also a foot path from the main cable car terminal to the Sky Room. It had a steel walkway with railings. I took this path on several occasions and once had to walk it with the wind whipping up one side of the mountain and screaming down the other. The wind was so

strong that the civilian rigger that I was with didn't want to risk taking the little cable car. You can find a picture and some background information on the footpath at <http://www.friendsofhaikustairs.org/FHS%20History%20Core.html>.

The antenna's ground plane, or counterpoise, was a system of wires on insulators strung on hundreds of telephone poles. These were arranged in a series of concentric circles surrounding the station. When inspecting the antenna system at night, you didn't need a flashlight. You merely held an old fluorescent lamp tube over your head. Unfortunately it would blink on and off with the Morse code being sent.



Schematic of the interconnection of an Alexanderson alternator with its auxiliary equipment.

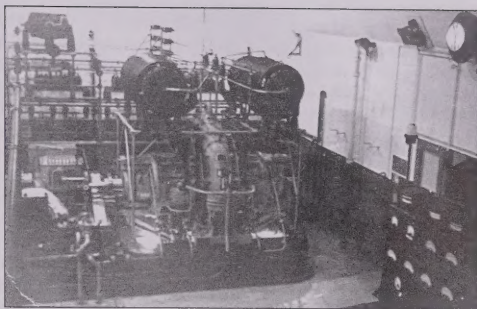
Vertical leads from the center of four of the antennas connected them to the transmitter building, a large bomb-proof concrete structure that had a roof about 8 feet thick filled with gravel. This building contained the two Alexanderson alternators. The fifth antenna was for a 50 kW CW vacuum tube transmitter that was also located in the transmitter building. This antenna did not go to the main building but went to the "helix house" some distance away and was coupled by underground coax to this transmitter. The was shared with an experimental VLF transmitter for Loran C which was manned by civilian engineers in another building.

The Alexanderson alternators were rotating electrical generators that developed 250 Kilowatts at 120 volts and 16 kilohertz. They were turned by large two-phase induction motors through a step-up water-cooled gear box of about 1:3 ratio. These alternators were the largest made, the last of several designs of increasing power.

This equipment was designed by Ernst Alexanderson (1878-1975), a GE engineer. A biography of Alexanderson may be found on the Internet at http://www.acmi.net.au/AIC/ALEXANDERSON_BIO.html

The 250 kW versions were manufactured between 1919 and 1922 and had "General Electric" cast into their base plates, although they were marketed by RCA. No others have been made since. RCA Global Communications used the alternators to transmit across the Atlantic during periods of solar storms. In the first few days of World War II, such a storm knocked out all other communications and Alexanderson alternators were the only means of communication between the U.S. and Europe.

The output of the alternators, stepped up to 2000 volts by air-core transformers, was directed to a bank of saturable reactors with mica insulation between the laminations in the cores to reduce losses at 16 KHz. These were sealed in cylindrical containers, about 4 ft. in diameter and 4 ft. high, containing transformer oil and were water cooled. They were tuned to the correct frequency by strapping in large mica capacitors so that the antenna system was in resonance during key down and out of resonance in key up. This was arranged so that the low impedance occurred in the key-down position, shunting the alternator's output to further increase the ratio between key-up and key-down power.

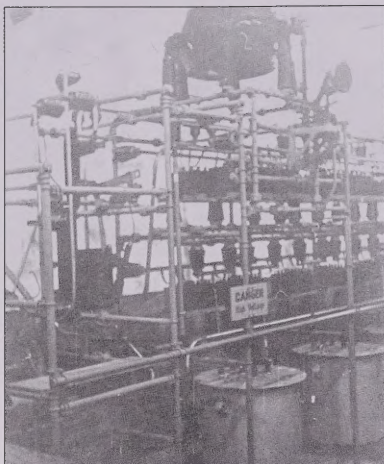


Alternator No. 1. Control panel at right.

Despite this, considerable power was present during the key-up condition and the difference in signal intensity between key-up and key-down was only 10 dB giving what was called a strong "back wave" in old parlance. Every once in a while we would receive a complaint from a ship's radio man about this and we had to explain that there was nothing we could do about it and that it was normal. These usually came from ships as they approached Pearl as our signal became strong. These messages were relayed to us by teletype from the NavComSta Headquarters at Pearl.

The alternator output was then directed to a large variometer in the helix room, which was sheathed in copper, for tuning purposes. From there it went to four loading coils, each about 4 feet in diameter and 7 feet high. A wooden spar sheathed in copper made the connection from the coils to the antennas. It was laid across the tops of the coils with its ends passing outside through large round holes in the walls. Two antenna downleads were connected to each end of the spar.

Once, just after I first arrived at Haiku, the station had to be taken off the air for repairs to the spar. The antenna had been grounded during the repairs. I was there when the knife switch was opened to remove the ground and observed the four-inch sparks that were drawn across the contacts. The civilian riggers said that the charge was caused by the wind blowing through the antenna. But, more accurately, the wind and atmospheric ionization carried away the antenna charge until the potential of the antenna equaled the Earth's normal electric potential. (The Earth's electric field is about 300 Volts/Meter. Most of the antenna wire is about 2,000 feet up or 700 meters giving 200,000 volts. The breakdown of air is about 3,000 volts/mm so the sparks would be 200/3 mm or 7 cm long, which



Saturable reactors for keying are at bottom. Resonating capacitors are in rack above. Variometer at top was not in use.

would be about 4 inches.) During original construction of the antenna system great pains had been taken to keep it grounded.

I was up in the helix room several times when the alternator was running. Everything there was hot with RF. You entered through a trap door, climbed a short wooden ladder on the wall of the room, then slowly lowered yourself down onto the copper sheathed floor next to the trap door. You had to take very small steps and inch your way across the room. You could feel the potential build up as you slid your feet apart. It was impossible to get closer than about five feet from the coils due to the a prickling sensation in the air which became intolerable. It was as though you were being stabbed by hundreds of needles. The engineer said that they used to take bets on who could get closest to the coils.

Compensation for speed variation of the alternator was accomplished by two standard power transformers used as saturable reactors with their primary windings in series with each phase of the induction motor stator coils. DC applied to the transformer secondaries from a small auxiliary generator partially saturated these transformer cores magnetically. The field current for this auxiliary generator was controlled from the output of one of the pick-off windings of the alternator which was sent through a tuned circuit that used a small variometer, and was rectified by a Tungar bulb. The DC produced was inversely proportional to the frequency of the al-

ternator. This feed back system kept the frequency about constant.

Further stabilization under load was provided by a large water rheostat (about four feet square and six feet high) that was connected across the induction motor's slip rings by a group of relays during key-down. Blowers that were always running extinguished the spark that developed across the relay contacts at key up. As a result the thing sounded like a dull clicking firecracker when it was keyed. There was also a continuous chatter from the step-up gear box in the drive system as the load switched between key-up and key-down conditions.

A second water rheostat was permanently connected across the drive motor's slip rings and was used to set speed in the key-up position. Water circulated continually over the rheostat's rods and flowed over a weir into the bottom of the tank where a heat exchanger cooled the water, which was then pumped back up to the rods. The weir changed the water level around the rod electrodes by a small motor controlled from the main operating panel. These two rheostats needed to be adjusted several times a day to compensate for changing wind and weather conditions in the antenna and for changes in line voltage and ambient temperature.

Cooling water for the equipment was supplied by four pumps in the pump room, two running and two spares. These were alternated each week. In fact, most equipment had spares that could be easily switched in. This included the pumps, motor-generator sets, relays, etc.

There was a cooling tower outside, perhaps 10 feet wide, 10 feet high and 20 feet long consisting of many rectangular tray-like planes stacked over each other where the water was air cooled. A pool under the tower stored the cooled water, which was replenished as needed by a ball cock valve controlling a water line.

The call letters of our station, NPM, were mentioned in a film called "Destination Tokyo" which was about a sub whose mission was to go into Tokyo Bay in early 1942 to get weather reports for Doolittle's raid in April. In one scene, they were on the bottom of Tokyo Bay and the radio operator said that he was getting NPM five by five. I recently rented this film and that scene had apparently been cut, probably because no one believed it. Actually, the signal received in that picture could not have originated from Haiku since that location did not go on the air until August 1943. It would have been sent from the RCA transmitting station, located elsewhere in Hawaii, which was also equipped with Alexanderson alternators.

I was told, while I was there, that it was then cheaper to run the whole base at Haiku, including the alternators, than to pay for the electrical power for the big Megawatt tube VLF transmitter at LuaLuaLei. Both had about the same radiated power; the higher efficiency of the Haiku installation was due to its larger antenna system as well as the higher efficiency of the alternators. It consumed about one-quarter of the power of the tube transmitter.

At Haiku, the radiation resistance of the antennas was about 1/3 of the total resistance of the copper so that, although 250 kW entered the antenna system, only about 80 kW were actually radiated despite the mammoth size of the antennas. The rest went up as heat in the antenna wires. But this radiated power was highly effective at that frequency and sufficient to cover the entire Pacific Ocean and then some.

I always thought that, after getting half way around the earth, the waves would converge and this would tend to raise the signal strength at the antipode. I tested this once by having the other fellow on my watch cause the alternator to wobble up and down in frequency while I listened to the signal on a receiver with the BFO off. I heard a very low frequency audio beat between the wave going out and the wave coming back which was delayed by 1/7 of a second after its trip around the world. This was only possible because the signal coming back was of high strength due to the convergence of the wave as it arrived back at the station. I often wondered if some of the back-wave problem was the signal coming around the Earth.

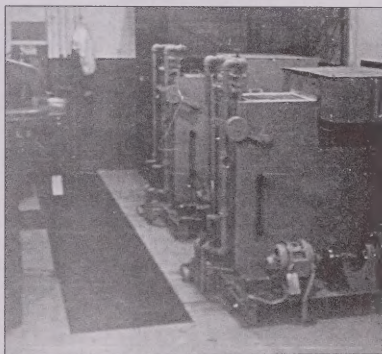
The 50 kW CW transmitter connected to the fifth antenna was water cooled with distilled water going through rubber hoses through its tube plates, which were 50 kV above ground, and then circulated back to a large truck radiator in the same room. It really heated up the room when it was running. I sent messages on many occasions using this transmitter with the hand key in the control room. Most of this traffic was to NSS at Annapolis. Auxiliary power during power failures was supplied by a 1000 HP diesel driving a 746 kW 3 phase 60 Hz generator.

The base itself was commanded by a Lieutenant and an Ensign with a total complement of 40 Naval enlisted personnel. Eight of these were Electronics Technicians of various ratings and stood watch in the transmitter building. At one time we were down to four and had to stand one watch on an one watch off continually for a few months, it was required that two sailors be on duty at all times. In addition, there were 17 Marines guarding the base and the general area around it.

I remember, often, hearing the echoing chatter and click of the alternator sending NERK NERK NERK, (a rhythmic da-dit dit di-da-dit dah-di-dah,) de NPM NPM NPM as it communicated with ships and submarines across the Pacific. NERK means "all ships and stations" and had been the call sign of the dirigible "Shenandoah." This was the Navy's way of preserving the call of that crashed airship as a memorial. It was sent preceding traffic, which was usually started on the hour. At the end of traffic, this call was sent continuously until the next hour.

The last operational Alexanderson alternator is installed in Grimeton Sweden and has the call "SAQ." It was last was operated on July 2, 2000 on the 75th anniversary of this Swedish coastal station. Frequency was 17.2 kHz. Information about the installation can be found at <http://www.telemuseum.se/grimeton/>. Hit the "English" button after you bring up the site!

These alternators could not compete against transmitters using large vacuum tubes. The con-



Water rheostats are at right. Note circulating water pump at base of forward unit. End shaft of alternator no. 2 drive motor can be seen at left.

struction and maintenance costs were high, with the gears and thrust bearings requiring periodic replacement. The machines were also limited in their frequency generating range. These factors offset their advantage of higher efficiency.

The Alexanderson alternators may be just about gone now but they served their purpose in a time when vacuum tubes were new and not powerful enough to do a similar job. Their design shows how a clever person can use existing technology in novel ways to solve a problem. Perhaps some of the ideas discussed here may, one day, be used in the design of future equipment yet to be dreamed of.

A COLLAGE OF IDEAS TRANSMITTER

This easy-to-build transmitter incorporates a collection of designs that appeared in the popular electronics press between 1930 and the early 1940s. It consumes no critical parts, can be crystal controlled or VFO driven, is very forgiving of construction and layout variations, and has respectable power conversion efficiency on 20 through 160 meters.

The primary design, basically a MOPA, is based on a two-tube, 20-160 meter "plug-in coil," crystal-controlled transmitter presented in the 1942 ARRL *Radio Amateur's Handbook* [1]. It uses an "inverted power amplifier" design [2a, 2b]. The original design was modified, but almost all of the modifications would have been accessible to the early 1940s electronics community, if not in wide use at the time.

The more academic radio aficionado knows that some design approaches showed up early in the literature, but did not gain popularity until a later date. For example, the pi output filter [3a, 3b] appeared in the latter half of the 1930s. However, it was not until the need for low-harmonic emission became evident in the post-WW2 era that the design became the industry standard for vacuum tube transmitter power amplifiers.

Other published design approaches never really caught on due to their complexity or component cost. For example, in amateur circles, the phasing type SSB generator rapidly lost ground to the lower cost, easier to build and adjust filter-type SSB generator.

Circuit Description

As shown in the schematics, the circuit design incorporates nothing unusual for the era, except for the Zener diode used to provide cathode bias for the 7C5. Following are the design highlights. Asterisked items are my departure from the '42 *Handbook* design.

1. *Tri-Tet crystal oscillator.* This design promotes the harmonic output required if multi-band operation is desired for a limited frequency range VFO or a particular crystal. For example, a Tri-tet will allow one to use a 1755 kHz crystal on 3510 kHz and 7020 kHz.

2. *Inverted amplifier PA.* Known as a "grounded control grid" circuit after WW2.

3. *Pi filter PA plate circuit.* Used instead of the '42 *Handbook's* parallel-tuned tank circuit with output link coil/built-in antenna tuner suitable for driving open-wire feed antennas.

4. *Loktal base beam power tube (7C5).* Used instead of the original 6L6. The 7C5, electrically similar to the 6V6, is listed in the 1942 ARRL *Handbook*.

5. *Link neutralization of the PA.* The original design had no PA neutralization. Without neutralization my transmitter showed no sign of self oscillation. However the minimum DC plate current and maximum RF output power were far from coinciding. By adding neutralization, I more than doubled the 20 meter output power. The link coils are interconnected with coax cable, which was known, but not popularly used, prior to the late 1940 era. A twisted insulated wire pair was more common.

6. *Stiffly regulated DC voltages.* A VR-tube supply was used in lieu of a voltage divider. This was done to minimize chirp caused by "dynamic instability."¹

7. *Zener diode grid bias.* The PA grid bias was changed from "self/grid leak" (likely Class AB2 or B2) to Class AB1 by adding a low-impedance fixed control grid/cathode bias. My zener diode "lazy man's approach" to establish the fixed bias was a post Korean War era development.²

This transmitter design is capable of delivering an RF power of about 7 to 8 watts to a 50 ohm load on the 40 and 80 meter bands, and about 4.5 watts on the 20 meter band. Using 6L6 tubes in lieu of the 7C5 tubes, along with a higher PA plate voltage, would no doubt yield more RF output power. Fundamental cut crystals could be used if a shorting link is placed across the Tri-tet's tuned cathode feedback circuit. I did not construct the 160 meter coil set.

Transmitter Construction

The transmitter was constructed on a surplus painted steel chassis approximately 11" x 18" x 2". There was more than enough room, and I could have included a built in power supply. However, I chose a separate, existing, power supply instead. The top deck of the chassis was cut

out using a metal cutting abrasive blade in my hand circular saw. A new sheet of $\frac{1}{8}$ " thick aluminum was screw-fastened over the deck opening to give me clean surface of high electrical conductivity chassis. An 8" high front panel was cut from the same material and screw-attached.

The '42 *Handbook* claimed that the "inverted amplifier" PA required no neutralization, and that's how I originally built it. After I decided to add link neutralization, I had to change the Tri-tet plate coil socket from 4- to 5-pin.

Lacking the specified $1\frac{1}{2}$ " coil forms, I rescaled all the cathode inductors to use $1\frac{1}{4}$ " phenolic forms, and the 80 meter PA plate coil to use a $1\frac{1}{2}$ " phenolic form [4]. The pins on my recycled coil forms seemed to be heavily tarnished or corroded, probably due to age and, perhaps, the use of corrosive solder flux. Polishing with emery paper took care of the problem. To facilitate the neutralizing adjustment, an ON/OFF toggle switch was installed in the PA filament line.

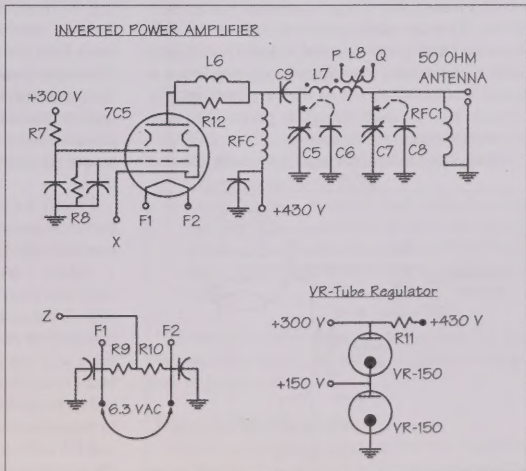
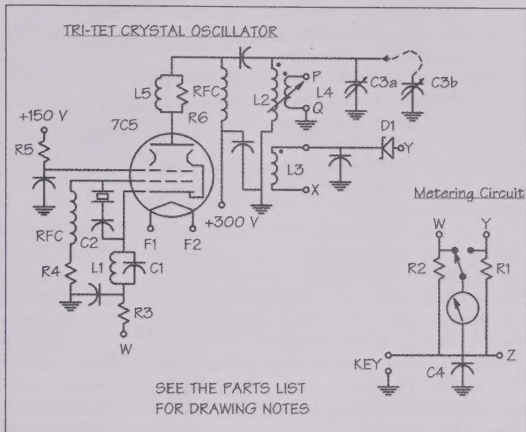
One other note regarding the Tri-Tet's plate coil form. Since the design uses shunt feed, the ground ends of the plate and neutralizing coils can share the same pin. If I had used 6-pin sockets and forms, each coil winding could have had its own separate set of pins. This would have allowed allow padding capacitors to be mounted inside the output pi coil form.

A divider plate was installed on top of the chassis between the Tri-Tet and inverted amplifier just in case the added magnetic isolation might be required. It turned out that it was not necessary, though it might have been if the oscillator and PA plate coils were closer together.

The cause of the PA's minimum plate current and maximum RF output not coinciding was primarily the PA tube's inter-electrode capacitance, and not external stray coupling. It is interesting to note that in the same edition of the '42 *Handbook* (pages 222-224) a

design is presented where a 6L6 Tri-tet drives a push-pull 6L6 inverted amplifier. That design's PA is "cross neutralized" by using fixed 10 pF capacitors, plate to opposite cathode.

I decided on a pi output circuit before construction started. My goal was to minimize harmonic output, specifically when operating the transmitter on 20 meters. I used the design equations presented in a recent *ARRL Handbook* [5] to give me a starting point for the output circuit. I chose Class AB operation using 1.6 as the "k" value, 400 Vdc as the plate voltage, and 40 mA



Schematics for all sections of the "Collage of Ideas" transmitter. See text and parts list for details.

as the DC plate current.

After construction and neutralization, I saw no reason to "tweak" the pi network's values on any band except for 20 meters. On 20 I had to find a PA plate variable capacitor that had a lower fully opened capacitance and a lower capacitance to ground and remove one turn on the 20 meter PA coil, L7, to get some tuning range from the PA plate variable capacitor.

I'm sure additional tweaking could have netted a tad more output and efficiency. No doubt the PA can be "hit harder," possibly to the point of turning the plates a dull red during operation. More output may result, but at what cost? Increased harmonic output? Shorter tube life? I left well enough alone.

I found that additional oscillator, pi circuit plate tuning, and output loading capacitance were necessary on 80 meters. I opted for another lazy man's approach, and used short clip leads to add padding capacitors. Using 5-pin forms for the PA coils (L7), if I'd had them, would have made it possible to install a mica padding capacitors inside. No excuses as to why I did not mount a padding capacitor inside the 80 meter Tri-tet plate coil form at L2.

This transmitter design approach lends itself to use of a wide variety of tubes. I chose the 7C5 because I had always wanted to build something with Loktal tubes. Also, I was not going to use a valuable 6L6 when the available power supply voltage was not high enough to permit that tube to develop more power output.

With appropriate voltage- and current-rated

Operating Voltages and Currents

(Measured at 7.043 kHz, approximately 7 watts output into 50-ohm dummy load.)

	7C5 TRI-TET	7C5 INVERTED PA
cathode current	12 mA	33 mA
cathode voltage	5.6	24
control grid current	600 μ A	23 μ A
control grid voltage	60	0.5
screen grid voltage	155	310
screen grid current	800 μ A	5.4 mA
plate voltage	310	410
VR-Tube current	30 mA key up, 26 mA key down	

Table 1.

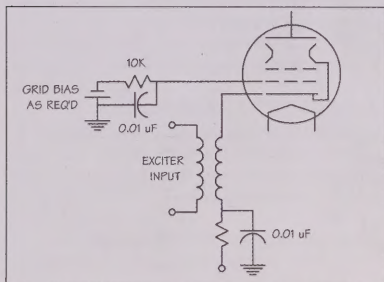
power supplies, you could use, as an example, a 6F6 Tri-Tet with an 807 as the inverted amplifier PA. Both of those tubes were known prior to 1942. Use what you have. Even a pair of Compactron beam power tubes can work in this configuration! The purist may argue that a Compactron is not a 1942 tube. But so what! Your overall design would still be 1942. A beam power tube is a beam power tube!

I key this transmitter using an interface circuit [6]. In order to help preserve the filament to cathode insulation of the tubes, both filament leads float above ground. The "center tap" of the filaments (junction of R9 and R10) is keyed. Note that the center tap is connected to the low side of each tube's cathode circuit. This approach minimizes the voltage stress between filament and cathode, specifically at key up conditions.

Finally be sure to check your filament transformer's current rating to make sure it is adequate for the tubes you are using.

Tables 1 and 2 list the DC operating conditions and plug-in coil winding data. Remember, one of the down sides of link neutralization is that the link coils are usually band-specific. Thus there is a separate neutralizing link for each Pi and Tri-tet plate coil.

If you opt for a single-band design and choose to neutralize your transmitter, plug-in oscillator and PA coils are not necessary. Be sure to mount the neutralizing link coils near the RF cold side on the Tri-tet plate coil, and RF the output side of the Pi coil (if you chose a Pi output). My guess



Modification of Tri-Tet circuit to accept VFO input see text).

Coil Winding Data

COIL	BAND	DIAMETER	# TURNS	LENGTH
L1	80	1¼"	11½	Spaced to 1", with an additional 100 pF silver mica across the winding mounted inside the coil form, #18 enameled.
	40	1¼"	7	Spaced to 0.7", #18 enameled
L2	80	1½"	26	Spaced to 1¼", #22 enameled
	40	1½"	15	1½", close wound, #18 enameled
	20	1½"	9	Spaced to 1½", #18 enameled
L3	80	9 turns close wound at end of L2, #22 enameled		
	40	6 turns close wound at end of L2, #18 enameled		
	20	4 turns close wound at end of L2, #18 enameled		
L4	80	3 turns, close wound on cardboard form, #20 AWG enameled		
	40	2 turns, close wound on cardboard form, #20 AWG enameled		
	20	2 turns, close wound on cardboard form, #20 AWG enameled		
L7	80	1.62"	28½	Spaced to 1½", #18 enameled
	40	1½"	17	Spaced to 1", #18 enameled
	20	1½"	11	Spaced to ¾", #18 enameled
L8	80	2 turns, close wound at end of L7, #14 AWG insulated solid		
	40	2 turns, close wound at end of L7, #14 AWG insulated solid		
	20	1 turn, close wound at end of L7, #14 AWG insulated solid		

L5 and L6 are 5 turns #24 insulated hookup wire, close wound over R6 and R12 (100-ohm, 1/2 watt resistors), respectively. Mount close to the tube's plate pin.

Table 2.

is that a fussier operator building the original design's parallel tuned output with link output coupling will also want to neutralize his transmitter. Watch the coil winding direction, and connection polarity. All coils on the same form should be wound in the same direction.

Neutralization

Neutralization is simple, just follow these 5 easy steps.

1. Turn the power supply on, but leave the PA filament toggle off. Wait one minute for warm-up.
2. Peak the Tri-Tet output using a loosely-coupled RF indicator, such as a grid dip meter in RF sensing mode.
3. Using an RF probe on your VTVM and the design load connected to the Pi circuit out-

put, peak the Pi circuit for maximum RF output.

4. Slide the neutralizing links on both the oscillator and PA coil forms for minimum RF indication on the VTVM.
5. Repeat steps 2, 3, and 4, then lock the neutralizing links in position on their coil forms with a dab of adhesive such as DUCO cement, coil dope, or even silicone bathtub caulk.

If the transmitter does not neutralize, try reversing the connections to the ungrounded neutralizing coil, L8.

Transmitter Operation

Operation of this transmitter from a crystal is no different than with other two-tube transmitters of the period. Since the oscillator is a Tri-tet, you must make sure that a shorting link is used

across the cathode tuned circuit when the transmitter is operated "straight through" (transmit frequency same as crystal frequency)—as, for example, when a 7027 kHz rock is used to transmit on ~7027 kHz³.

If output is desired on the second harmonic, ~14054 kHz, make sure to use the 40-meter Tri-tet cathode coil and the 20-meter PA plate coils. Do not ask the PA to double the oscillator's frequency by using the 40 meter Tri-tet plate coil. Inverted amplifiers have a lot of degeneration. They make poor frequency multipliers.

Also remember that tone quality is a function of crystal activity, oscillator voltage regulation, and Tri-tet plate tuning. If you know how to grind crystals, good for you. You can probably

peak a crystal's activity.

I'm far too heavy-handed to master the art of crystal grinding. I can only rely on plate tuning to clean up my tone. This means tuning the plate coil to the "slow" side, i.e. lower capacitance then necessary to peak the oscillator's output. This usually takes most of the slight "startup chirp" sound out of my note. The cost to clean up the note is an insignificant reduction in PA output.

One other thing, the load isolation for a beam power tube Tri-tet is not as good as that of a true pentode ECO crystal oscillator, especially on fundamental mode operation. The inverted amplifier loads the oscillator far heavier than would a grid-driven neutralized PA. However, my experience is that this transmitter's

fundamental mode tone is acceptable to the "ear" of the majority of modern operators. The 20-meter tone is surprisingly good using 40-meter fundamental crystals.

I have not tried running my transmitter from a VFO. The '42 edition of the *Handbook*, as well as other period publications, suggest circuit modifications to run crystal controlled oscillators from a separate exciter [7]. I'm including a redrawn version of the '42 *Handbook's* circuit for fundamental mode operation of the Tri-tet from an exciter. You will note that in this application the former oscillator stage is in an "inverted amplifier" configuration rather than a grid driven one. Otherwise, the stage might have to be neutralized if used as a fundamental amplifier. If the VFO is not keyed, neutralization would also help to decrease the transmitter's "back-wave" (oscillator feed through at key up conditions).

The inverted amplifier configuration of the transmitter oscillator stage will heavily load an external exciter/VFO. Hence, to minimize oscillator frequency pulling, the exciter must have its own buffer stage capable of delivering an adequate amount of RF power. A low power FET VFO/source follower buffer of modern design will probably not

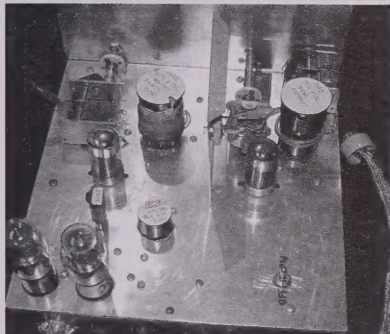
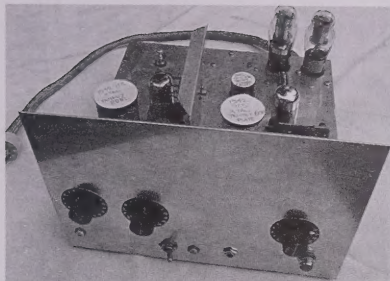
Parts List and Drawing Notes

R1,2	15	, 1 W
R3	470	, 1 W
R4	100 K	, ½ W
R5,6,7,9,10,12	100	, ½ W
R8	22 K	, ½ W
R11	6000	, 10 W
C1	100 pF silver mica.	
C2	1000 pF silver mica.	
C3A	½ of a 2 section variable, 100 pF	
C3B	½ of a 2 section variable, 100 pF	
C4	0.05 µF, ceramic or paper	
C5	100 pF variable	
C6	50 pF variable, or fixed 1000 VDC transmitting mica	
C7	dual 375 pF per section variable, sections connected in parallel	
C8	1000 pF, 1000 VDC transmitting mica	
C9	0.01 µF, 2 kV ceramic	
D1	four 6.2 volt, one watt zener diodes in series, RS 276-561 or equivalent	
RFC	2½ mH, receiver type, 3 required	
RFC1	100 µH, receiver type	

Notes

1. Unmarked capacitors on the schematic are 0.01 µF, 600 VDC disk ceramics.
2. Short small alligator clip leads are used to connect C3b, C6 and C8. Other means may be used to connect the padding capacitors if multiband operation is desired.
3. The meter movement is a 50 mA analog unit.
4. A #49 bulb was mounted in series with the crystal. It does not light since crystal current proved to be very low. (#49 bulb is rated 60 mA at 2.0 volts)

Table 3.



Front and rear views of the "Collage" transmitter.

be able to drive this transmitter to full power. Finally, if the original *Handbook* design is built, you must simultaneously key both transmitter stages. The original design PA has no protective bias if the cold side of the cathode coil (L3) is grounded and there is no oscillator signal.

Conclusion

Have fun with your early 40s "collage" transmitter. There are all sorts of period design possibilities that can be realized using your junk box stash of parts. Just be careful! These transmitters were customarily built on metal chassis, but without a protective cover. Operation without a cover facilitated coil change-out. You could suffer r.f. burns if you do not watch where you stick your fingers. Though series feed of either or both plate circuits is a design possibility, the result will be increased DC shock hazard. ☐

REFERENCES

- (1) Pages 216-219, ARRL *Radio Amateur's Handbook*, 19th Edition, Second Printing, March 1942. Note, in 1942 the ARRL published a "Special Defense Edition" of the

Radio Amateur's Handbook. This transmitter does not appear in the special edition.

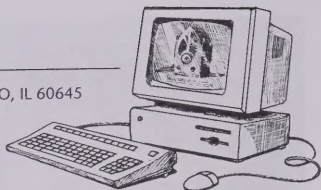
- (2a) H. Ramander, "The Ultraudion Amplifier," *QST*, Sept 1933, pages 14-18.
- (2b) R. P. Austin, "Type 59 Tube As Inverted Amplifier," *QST*, June 1935, page 42.
- (3a) F. Priest and L. Turner, "Norfolk Amateurs Prepare For Emergencies," *QST*, Sept 1938, pages 8-10, and 122.
- (3b) S. Johnson, "One Tube Transmitter," *Radio News*, Sept 1938, pages 43 and 71.
- (4) Calculate the design's inductance using the inductance equation for a plain solenoid wound coil as found in many of the editions of the ARRL *Radio Amateur's Handbook*, i.e., page 2-17, 69th edition, 1992. Then, using the other forms of this equation, calculate the number of turns required to achieve the desired inductance for the new coil form's diameter.
- (5) Page 13.3-13.4, ARRL *Radio Amateur's Handbook*, 77th edition, 2000. These same equations have appeared in many prior editions of the ARRL *Handbook*.
- (6) Pages 50-52, and 54, "A CW Keying Interface Circuit For OT and Classic Transmitters," F. J. Lotito, *The OTB*, Vol. 42, #1, February 2001.
- (7) Pages 245-247, ARRL *Radio Amateur's Handbook*, 19th edition, second printing, March, 1942.

FOOTNOTES

- 1 Oscillator frequency variations due to varying plate voltage, and if applicable, screen grid voltage variations as in an ECO or Tritet, are referred to as "dynamic instability."
- 2 A separate negative voltage control grid bias supply could have been used. This is more representative of the era. The supply could be constructed from a low power/low voltage plate transformer with a 5 VAC filament winding. A period type rectifier tube such as the 5Y3 or 80 could be used. In the interest of electrical safety, I would not recommend the "transformerless" design bias supply presented on page 239 of the '42 *Handbook* and elsewhere in other period literature.
- 3 ~7027 kHz means approximately 7027 kHz. The exact oscillator frequency is dependent upon many electrical and mechanical factors. For a 40 meter crystal it can be as much as 4 kHz different than the marked frequency.

ON THE INTERNET

EDITED BY **CHUCK SCHWARK**, 7454 N. CAMPBELL AVE., CHICAGO, IL 60645
PLEASE INCLUDE SASE FOR REPLY. E-MAIL: caschwark@aol.com



Radio Monitoring Resources on the Web

The topic for this column was inspired by a tip I received from our "Below 535" Editor, Frank Lotito, K3DZ. There may be a perception that the hobby of searching for and monitoring non-local radio transmissions (often generically called SWLing, though these activities certainly include medium, broadcast band and longwave listening) is dying out. But after browsing the subject on the Internet, I find that there

seems to be just as much interest as ever. Digital broadcasting notwithstanding, the use of "analog" radios is still proliferating among listeners world-wide.

Of course radio listening is as old as the existence of radio messages. As long as there were transmissions in the "aether" there have been those who wanted to listen in. Of course the original "listeners" were the operators employed by the companies set up to provide point-to-point wireless telegraph communication links. As radio caught on, many amateurs started to listen in and then construct their own stations. There wasn't much variety to what they could tune in on: primarily commercial traffic such as ship-to-shore messages and other amateurs.

As radio technology became more widespread and sophisticated, radio listeners had an ever-expanding menu of voice and morse targets to tune in. These included cultural and news programming broadcast by international stations; sporting events not heard locally but covered by distant broadcast stations; utility stations run by news networks or other commercial interests; military transmissions; and amateur communications.

The Internet sites devoted to radio listening are too numerous to mention, but here are a few interesting ones to get your feet wet. Most of these sites have links to other sites for your further exploration. Browse and enjoy!

Shortwave Radio Listening Resource Center of NW7US

<http://shortwave.hfradio.org/>

A personal collection of information, links, and other resources related to amateur radio, general high-frequency communications, and related areas.

Shortwave Listener

<http://www.rac.ca/swl.htm>

This Canadian website features a few direct links to the home pages of well known international shortwave broadcasters, as well as links to some of the many excellent shortwave directory pages around the web.

National Radio Club

<http://www.nrcdxas.org>

The National Radio Club is the world's oldest and largest Medium Wave DX club, founded in 1933. The National Radio Club is a non-profit radio club consisting of members and volunteer editors devoted to the broadcast radio hobby. The organization features two publications.

Association of North American Radio Clubs

<http://www.anarc.org>

The Association of North American Radio Clubs (ANARC) was founded in 1964. ANARC is made up of a number of member clubs. Plenty of good information and resources for the new or experienced listener.

Ontario DX Association

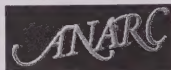
<http://www.odxa.on.ca/>

The Ontario DX Association (ODXA) is a club for radio listeners. Organized in 1974 to fill the need for a club that would concentrate on organizing local SWLs (ShortWave Listeners) by holding meetings and publishing a regular bulletin containing listening tips.

North American Shortwave Association

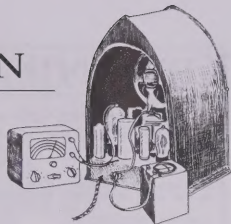
<http://www.anarc.org/naswa/index.html>

Home page of NASWA, North America's oldest shortwave broadcast-only radio club, active in the business of sharing information about



EQUIPMENT RESTORATION

EDITED BY **KEN OWENS**, 478 SYCAMORE DR., CIRCLEVILLE, OH 43113
radiowd11@yahoo.com
PLEASE SEND CORRESPONDENCE DIRECTLY TO THE ABOVE ADDRESS,
INCLUDING SASE FOR REPLY.



Correcting Long-Ago Repairs

You never know what lurks in those old radios you are trying to restore. Sometimes, a long-ago repairman did things which can give us headaches today unless we are alert.

John Kaetz, Jr. (Bessemer, AL) gives two good examples. A Truetone Model D-2029 had low volume and a severe speaker rattle on long cone excursions. The audio was fine with a test speaker. Inspection of the speaker revealed cone and voice coil numbers which identified them as Waldom parts used for reconing years ago. I did this kind of service in the early '50s.

A close look showed that the voice coil winding was just barely immersed in the air gap. This caused the low volume. When driven hard, the coil would leave the air gap entirely and strike the edge on re-entry causing the rattle.

I shimmed the coil to keep it centered, softened the glue with lacquer thinner, and slid the coil down into the air gap. When dry, the speaker worked well. This is a touchy job and could have turned out poorly, but 5" 7" speakers don't grow on trees these days.

The second problem occurred with a GE Model 607. After being brought to life, it absolutely would not track. Sensitivity was poor at the low end and 600 kHz came in where 800 kHz should be. The high end could be tracked, but the oscillator trimmer was wide open.

I noticed that the trimmers were on the inboard side of the tuning gang where they were very hard to reach. I also noticed that the dial pointer travel was only about 75% of what it should be. The light came on!

I had a parts chassis of the same model. Its tuning capacitor had a slightly larger drive pulley and appeared to have different plate spacing. It also had its trimmers on the outboard side. Otherwise, the

capacitors appeared identical. I switched capacitors and the radio aligned and tracked nicely.

It appears that someone replaced the tuning capacitor with an available look-alike with the wrong capacitance range. This is a rare happening, but the moral of this story is to be prepared for anything in radios that have been around for 50 years or more.

Hum-Bucking Problem

The other night a friend called me. He was restoring a Sparton Model 15 which still hummed loudly after the filter caps were replaced. The hum didn't change even when the output tube was unplugged!

He mentioned that the speaker had been reconed and the output transformer on the speaker was a replacement. I asked him if the speaker had a hum bucking coil; it did. I suggested that he swap connections to the coil.

He called back a few minutes later to report that the hum was gone, and the set sounded fine. We then discussed the function of the coil. There is a high 120 Hz ripple voltage on the field coil of an electrodynamic speaker. Instead of a steady magnetic field surrounding the voice coil, the field is modulated at the power supply frequency. This induces an AC voltage in the voice coil which responds accordingly.

The hum bucking coil is wired in series with the voice coil and out of phase with it. An equal hum voltage is also induced in the hum bucking coil, but the two voltages cancel each other.

In the process of reconing the speaker and replacing the output transformer, the connections to the hum bucking coil had been reversed so that the hum voltages reinforced each other instead of cancelling. ☐

shortwave radio since 1961. NASWA is a member club of ANARC, the Association of North American Radio Clubs.

SPEEDX

<http://www.cybercomm.net/~slapshot/speedx.html>

A well-known Shortwave and DXing Web page dedicated to preserving the engrossing enjoyment of DXing and shortwave listening. ☐

Oops!

In my February 2003 column, a tube museum was inadvertently left out of the listing of Tube and Valve Data. This site, The Virtual Valve Museum at <http://www.tubecollector.org>, is the creation of Jeremy M. Harmer in the UK. Many of the exhibits have data as well. Great site to bookmark!

KEY AND TELEGRAPH

EDITED BY **JOHN CASALE**, W2NI, 3 PICKERING LANE, TROY, NY 12180
PLEASE INCLUDE SASE FOR REPLY. © 2003, J. CASALE



Horace G. Martin

— *Part Three: A Vibroplex in Every Telegraph Office* —

Some of the first telegraphers to use Horace Martin's Autoplex in the U.S. were known as "Bonus Men." Both Western Union and Postal Telegraph companies had contracts with such telegraphers, who were capable of sending large numbers of messages in the shortest period of time. Bonus Men were paid a premium for each message sent over an agreed upon quota. In turn, the companies provided them with the best possible telegraph circuits and kept routine company traffic interruptions to a minimum. These circuits were called "Bonus Wires."

Martin's instrument was very attractive to the Bonus Man. He could maintain a high speed for an entire shift and not be subject to the fatigue and strain of using a standard Morse key. But the Autoplex was owned by the telegrapher rather than the company and required a local battery. So the telegrapher had to transport the required dry cells to each shift along with his autoplex.

Telegraphers argued that their companies should provide a permanent bonus desk equipped with a "suitable local arrangement" of the station's batteries. Companies were generally willing to comply, but they could not agree on a standard coil resistance for the electro-magnets to be used by Martin and other emerging makers of "magnetic" type keys. This provided motivation for Martin and other inventors to design a totally mechanical transmitter.

In May of 1904, Martin filed for his second

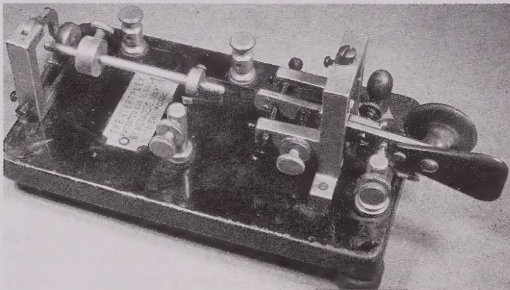
transmitter patent. It included his first attempt at a totally mechanical design, utilizing a vibrating pendulum to produce dots. In this design, the key lever runs parallel to a spring-mounted horizontal pendulum, holding it in a position that puts tension on the spring. When the operator moves the key lever to the right, the lever withdraws from the pendulum, allowing it to vibrate.

But it is unlikely that this design went into production. Martin appeared to have problems with the vibrating efficiency of this pendulum right from the start. In fact, the two other design options in this patent relied upon electro magnets to help amplify the pendulum swing. Also, four months earlier, another telegrapher, William Coffe of Cleveland, filed for a patent that used a similar lever design with an unassisted vertical pendulum.

In Martin's next mechanical design attempt, he distanced himself from any similarities with the Coffe patent and greatly improved the efficiency of the vibrating pendulum. The design incorporated the lever, main spring, and pendulum all in one piece. This one-piece vibrating pendulum became the basis for the name, "Vibro"-plex.

In the new design, moving the key lever to the right forces it to strike a stop after causing the spring mounted pendulum to go into vibration. After the desired number of dots are produced via the contact spring on the pendulum, the operator releases the key, the lever returns to its static position, and the pendulum is arrested by a damper. The dashes are produced by moving an independent lever to the left. This design resulted in Martin's third transmitter patent. It was filed on April 16, 1906 and is today referred to as the "original" design.

There has been an ongoing debate surrounding the actual introduction date of Martin's Vibroplex. The confusion is generated by the date of Martin's second transmitter patent (1904) shown on labels of early production models of the Vibroplex. How-



An early production Martin Vibroplex – serial #679.

ever, there is no evidence indicating that a mechanical transmitter of any type was either manufactured or formally introduced by Martin in 1904. In fact, it appears that the very first public introduction of the Martin Vibroplex took place in May of 1905 and it did not occur in New York, but about 750 miles further south in Tennessee.

The biggest trade show in the telegraph industry during this era was held during the annual Railway Telegraph Superintendent's Convention. These superintendents, jointly employed by the railroad and telegraph companies, were very influential in recommending the purchase of telegraph supplies. The convention for 1905 took place in Chattanooga, Tennessee and superintendents from all the major railroads in the U.S. and Canada were present.

Chattanooga, located 50 miles north of Adairsville Georgia, was in Martin's home territory. One of the local papers stated that he had friends and family in Chattanooga and used to be referred to as the "boy wonder telegraph operator." On May 17, 1905, a listing of exhibits at the convention showed that UEM had samples of their batteries on display, along with the Martin Vibroplex — which was drawing a lot of interest.

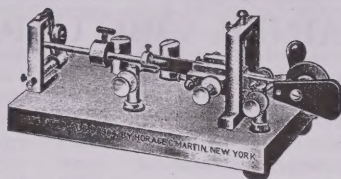
Back in New York, UEM was expanding their facilities at 53 Vesey St. The offices and store rooms would now occupy the second floor, while the manufacturing facilities where Martin was building the Autoplex and Vibroplex were located up in two large lofts that extended the entire depth of the building.

UEM's most popular products at this point were not the Martin keys, but the Uneco and Autoplex dry cells, both 2½" 6" in size, sold for various applications. Martin was also advertising that his manufacturing facilities, now upgraded with new machinery, were available for contract and royalty work.

One of the first formal evaluations done on Morse transmitters was done by the Postal Telegraph Company in September of 1906. The purpose of the evaluation was not to recommend one particular model over the other, but to compare sending with mechanical and magnetic transmitters to sending with a conventional Morse key.

The transmitters evaluated were a mechanical and magnetic version of the Auto-Dot, a Mecograph # 4 (derived from the Coffe patent), Mar-

MARTIN'S VIBROPLEX The Perfect Transmitter



Operated without a battery; embodies all of the essential features of Martin's famous Autoplex.

Scientifically constructed, it will carry on the longest of circuits.

Its signals can instantly be made light or heavy, slow or fast.

Its touch is easy and elastic, and adjustable to suit the sender.

IT IS EASY TO LEARN—A PLEASURE TO USE.

If you have lost your grip—
If it tires you to work the Morse key—
If you have a heavy, exacting sending trick—
If you wish to send perfect Morse at any speed,

You Need a

VIBROPLEX

For it makes the dots.

Write for circulars containing description and testimonials.

UNITED ELECTRICAL MANUFACTURING CO., Inc.

53 Vesey Street

New York

From Telegraph Age, May 1906.

tin's Autoplex and Vibroplex, and a Yetman Morse typewriter transmitter.

Present for the evaluation were George Conkling, the G.M. of the Delany Telegraphic Transmitter Co., representing the Auto-Dots; D.A. Mohoney, New York sales agent for the Mecograph Co.; Horace Martin; and J.P. Gallagher of the Yetman Transmitting Typewriter Co. The Yetman produced uniform characters, but was physically demanding on the sending operator, and its perfect machine-like Morse was considered tiresome for the receiving telegrapher. Also, its individual characters could not be slowed down.

The Autoplex and the magnetic Auto-Dot transmitters, if properly adjusted and using good batteries, produced the "most reliable signals." The all-mechanical transmitters, including the Auto-Dot, Mecograph and Vibroplex, were all considered capable of producing favorable signals but it was felt that "bonus men" and first class press operators were the only ones that were operating them properly.

The average operator was criticized for not knowing how to adjust the transmitters correctly, causing many errors on Postal's system. Martin dealt with the problem of educating and reaching the average telegrapher on several fronts. He became what is known in the Ham Radio ranks today as an "Elmer" (mentor) to many telegraphers—personally helping them make the transition from a straight key to a Vibroplex.

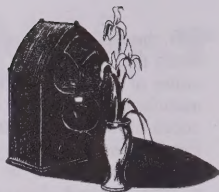
He solicited the aid of some of his telegrapher friends, many of them only in their twenties, signing them up to be agents and give demonstrations in various U.S. cities. To encourage home practice, Martin offered his small "Gem" key and sounder set for a dollar, with the idea that its sounder could be used as a receiver with

(continued on page 54)

RECENT RADIO, TV AND ENTERTAINER OBITUARIES

COMPILED BY **CHARLES S. GRIFFEN WIGYR**

1225 NEW BRITAIN AVE., WEST HARTFORD, CT 06110-2405



Note: When known, the date of death is indicated in parenthesis.

ROONE ARLEDGE, 71, (12-5-02) television executive. Arledge's "creativity, leadership and technical innovations" revolutionized the way television news and sports were presented. He created *Monday Night Football*, *This Week* with David Brinkley, *Wide World of Sports*, *Nightline*, *20/20* and *Prime Time Live*. Arledge introduced slow-motion and freeze-frame views, instant replays, hand-held cameras and the use of microphones near playing fields. He won 37 Emmys for creating these programs and new production innovations. Arledge was President of ABC Sports from 1968 through 1986 and President of ABC News from 1977 to 1997. He had a keen eye for talent and rewarded them with high salaries and celebrity status. Some of the beneficiaries included Howard Cosell, Frank Gifford, Barbara Walters, Peter Jennings, and Diane Sawyer. He began his career as a production assistant with the DuMont Television Network in 1952.

LESLIE G. ARRIES, JR., 77, (12-1-02) television executive. Arries was President and Chief Executive of WIVB(TV) in Buffalo from 1967 until retirement in 1989. In the mid-1960s he was General Manager of Westinghouse Broadcasting's KYW(TV) in Cleveland and then became President and CEO of Westinghouse Production and Syndication Co. in New York City. In this position he was responsible for developing, producing and syndicating the Merv Griffin and Mike Douglas shows. Arries began his career in 1946 helping to build DuMont Television's experimental station W3XWT, now WTTG(TV), in Washington, DC.

PARLEY BAER, 88, (11-22-02) character actor. Baer appeared in more than 60 motion pictures, 1,600 television programs, and 15,000 radio programs and was the voice of the Keebler cookie elf in television commercials. He made his film debut in 1950 in *Comanche Territory*. Some of his other film credits include *The Young Lions* (1958), *Gypsy* (1963), *The Amazing Dobermans* (1978), *Carbon Copy* (1981) and *Dave*, (1993). Baer's final film was *The Last of Dogman* in 1995. On television Baer had leading

roles on *The Adventures of Ozzie & Harriet* (ABC 1955-1961), *The Andy Griffith Show* (CBS 1962-1963), *The Double Life of Henry Phylfe* (ABC 1966) and *The Young and the Restless* (CBS) beginning in 1993. He also made guest appearances on *Bonanza*, *Dragnet*, *Father Knows Best*, *I Love Lucy*, *Lassie*, *Perry Mason* and *You Are There*. Baer was heard on many radio programs including *The Count of Monte Cristo*, *Dragnet*, *Gunsmoke* (CBS 1952-1961), *Lux Radio Theater*, *My Friend Irma and Yours Truly*, *Johnny Dollar*. Baer began his radio career at KSL(AM) in Salt Lake City, UT in the 1930s.

ED BLISS, 90, (11-25-02) broadcast journalist and educator. During his 25 years with CBS radio and television, Bliss wrote and edited the news summary for Edward R. Murrow's 15 minute broadcasts, worked with Fred Friendly, former President of CBS News, on *CBS Reports* and served as CBS News President Dick Salant's Executive Assistant. In 1963 he became the News Editor for the *CBS Evening News* with Walter Cronkite. He joined CBS as a writer in 1943, but left the network in 1968 to start the broadcast journalism program at American University's School of Communication. He retired from the school in 1977, the year he was named professor of the year by the Society of Professional Journalists.

EDDIE BRACKEN, 87, (11-14-02) actor. Bracken performed on the stage, screen, radio and television. He made his stage debut in 1933 in *The Lady Refuses*, but his big break came in 1936 when George Abbott asked him to be in *Brother Rat* followed by the Rogers and Hart musical *Too Many Girls*. Bracken appeared in other Broadway shows and in the 1970s toured with Carol Channing in *Hello Dolly!* He was cast in 35 films and won acclaim in 1944 for roles in *The Miracle of Morgan's Creek* and *Hail the Conquering Hero*. On television Bracken was a panelist on *I've Got a Secret* (CBS 1952) and *Make the Connection* (NBC 1955), moderated *Masquerade Party* (NBC 1957) and performed on *Tales from the Darkside* (Syndicated 1984). On radio he played the part of Dizzy on *The*

Aldrich Family, hosted *The Eddie Bracken Show* (NBC 1945, CBS 1946-1947) and was a panelist on *Let's Talk Hollywood* (NBC 1948). Bracken began his career as a child performer.

MARY BRIAN, 96, (12-30-02) actress. Brian appeared in 82 films that bridged the silent to the early sound era. She was one of Hollywood's romantic leading ladies from the mid-1920s through the late 1930s and played opposite such stars as Gary Cooper, Lew Ayres, James Cagney, Cary Grant and Dick Powell. While Brian was under contract to Paramount she appeared in 40 of their productions, many as juvenile leads. Some of her film credits include *Peter Pan* (1924), *Hollywood on Parade No. 9* (1933), *Star Night at the Coconut Grove* (1934) *The Man on the Flying Trapeze* (1935) and *Dragnet* (1947). Brian performed in vaudeville productions at the Palace Theater in New York City in 1932 and during the 1940s toured with Edmund Lowe.

JOY HODGES, 88, (1-19-03) singer and dancer. Hodges starred on Broadway with George M. Cohan in *I'd Rather Be Right* (1937), *Nellie Bly* (1946) and replaced Ruby Keeler in *No, No, Nanette* (1972). In 1935 she signed a five year contract with RKO and made her first film appearance that year in *Old Man Rhythm*. Hodges sang on WHO(AM) in Des Moines, IA, where she met Ronald Reagan who was a sportscaster, and was one of the vocalists on *The Joe Penner Show* (CBS 1933-1935). In 1937, while Hodges was singing at Hollywood's Biltmore Bowl, she was visited by Reagan who sought her advice about pursuing an acting career. She contacted her agent who met him and sent him to Warner Bros. studios for a screen test. Hodges assistance helped launch Reagan's film career and created a friendship that lasted sixty years.

H. TAYLOR HOWARD, 70, (11-13-02) radio scientist. Howard created the first known home satellite television system in his backyard in 1976. He sent a \$100 check to HBO to pay for the movies he had watched, but it was returned with a note stating they only dealt with large cable companies. Later he patented the feed horn, used to receive satellite signals and convert them to signals, and co-founded Chaparral Communications Inc. to produce them. Howard was associated with Stanford University from 1959 to 1982 and held a number of posts including Adjunct Professor of Electrical Engineering, co-director of the Center for Radar Astronomy and Associate Director of the Stanford Radioscience Laboratory (now called STARLab). He was also a principal investigator with the National Aeronautics and Space Administration overseeing

experiments probing the atmospheres of Venus, Mercury and Jupiter.

WARREN REX ISOM, 92, (1-11-03) recording engineer. Isom joined RCA in Indianapolis, IN after WWII, but later moved to the RCA Defense Electronics Products Division in Camden, NJ. In 1966 he returned to Indianapolis as Chief Engineer of RCA's Record Division and remained there until retirement in 1976. In addition to holding many patents, Isom wrote the forward, section introductions and one portion of "The Phonograph and Sound Recording after One-Hundred Years," in the *Journal of the Audio Engineering Society*, Vol. 25 No. 10/11, October/November 1977. Isom also served as the Chairman of the U.S. delegation to the International Recording Standards Association.

BUDDY KAYE, 84, (11-23-02) songwriter and lyricist. Some of Kaye's most popular songs, written with Ted Mossman, were *Till the End of Time*, recorded by Perry Como, and *Full Moon and Empty Arms*, recorded by Frank Sinatra. Other hits and the name of the recording stars are "A"—*You're Adorable* (Perry Como), *Old Songs* (Barry Manilow), *Speedy Gonzales* (Pat Boone) and *I'll Close My Eyes* (Sarah Vaughan, Dinah Washington and Ella Fitzgerald). He was the co-writer of the theme music for the television show *I Dream of Jeannie* and wrote the title songs for the films *Change of Habit* and *The Trouble with Girls*, which starred Elvis Presley.

ELLIS LARKINS, 79, (9-29-02) jazz pianist. Larkins was known "for his understated elegance as an improviser and his sensitivity as an accompanist." His reputation was established when he recorded *Ella Sings Gershwin* with Ella Fitzgerald in 1950 and *Songs in a Mellow Mood* in 1954. During the late 1950s and through the late 1960s Larkins did studio work, taught and did occasional performances with vocalists. In the 1970s, when New York City experienced a jazz renaissance, he was in demand for supper clubs such as Gregory's and the Carnegie Tavern in New York City.

ERNEST LEISER, 81, (11-26-02) television news producer. During Leiter's 29-year career with CBS News he reported from Eastern Europe during the Cold War, later became a news producer and was a key figure in the network's transition from radio to television. He hired Dan Rather (current anchor of *CBS Evening News*) in 1961, was named Director of *CBS News* in 1964 and was Executive Producer of the *CBS Evening News* with Walter Cronkite. In 1967 Leiter became head of *CBS Special Reports* which received Emmys in 1970 and 1971. From 1972 to 1975 Leiter was an Executive Producer for *ABC*

News, but returned to CBS in 1975 to coordinate special events coverage which included the 1976 bicentennial celebration. He joined *CBS News* in 1953 as a reporter on the nature show *Adventure*. Leiser retired in 1985 to teach at Columbia University and the Gannett Center for Media Studies.

LARRY LESUEUR, 93, (2-5-03) broadcast journalist. LeSueur was one of the last surviving members of the group known as "the Murrow Boys" who helped take broadcast journalism to new heights as they reported the news from Europe during World War II. His broadcasts for CBS provided Americans with on-the-scene reports of the German bombings of London, the Normandy invasion, Germany's march across the Soviet Union and the first news of the Allied liberation of Paris. LeSueur joined Edward R. Murrow's London staff in 1939. After the war LeSueur served as CBS' White House correspondent, reported on the Paris peace talks, the Pearl Harbor investigation hearings and the development of the United Nations. LeSueur also appeared on CBS Television as moderator of *Chronoscope* (1953-1955). He left CBS in 1963 to join Murrow at the U.S. Information Agency where he covered the White House for the *Voice of America* until retirement in 1984. He began his career as a reporter for the United Press in 1936.

THOMAS L. MANN, 53, (12-19-02) broadcast engineer. Mann was Vice President of Engineering for USA Broadcasting and was responsible for designing and building their \$26 million multi-station, multicast Group Operations Center in Ontario, CA. He left the firm to form Weyrcliffe-Century, Ltd., a technology consulting and management firm in Palm Springs. Earlier in his career he held positions as Managing Director of Operations and Engineering for NBC affiliate WRC(TV) in Washington, DC., Director of Engineering for KCAL(TV) in Los Angeles and Corporate Vice President of Engineering and New Technology for Argyle Television.

STAN MARTIN, 64, (1-28-03) broadcaster. Martin held management positions and hosted a Monday afternoon celebrity program on WQEW(AM) in New York City from 1992 to 1998. He joined the station, owned by *The New York Times*, as Program Director in 1992. That year *The Times* changed the station's format from classical music to popular music and changed its call letters from WQXR(AM) to WQEW(AM). Later Martin was named manager of the station but left when it was leased to ABC in 1998 and became a part of Radio Disney. After leaving WQEW he became master of ceremonies for cabaret shows in Manhattan. Martin began his career in 1959 at WDLC(AM) in Port

Jervis, NY and later worked for a number of major radio stations in New York City and Philadelphia.

WILLIAM T. ORR, 85, (12-25-02) television executive. Orr was the Warner Bros. executive credited with convincing the movie studio to enter the television production business. As head of Warner Bros. Television from 1955 to 1963 he presided over 24 shows including *The Roaring Twenties* (ABC 1960-1962), *Cheyenne* (ABC 1955-1963), *Maverick* (ABC 1957-1962), *77 Sunset Strip* (ABC 1958-1964), *No Time for Sergeants* (ABC 1964-1965), *Colt 45* (ABC 1957-1960), *Hawaiian Eye* (ABC 1959-1963) and *Bourbon Street Beat* (ABC 1959-1960). Orr pioneered many of the methods used in adapting film techniques to television and, over time, proved that television could equal movies in producing revenue and employment opportunities. He began his career as an actor with Warner Bros. and in 1945 became Jack L. Warner's Executive Assistant.

RICHARD W. SIMMONS, 89, (1-11-03) actor. Simmons played the part of Sgt. Preston in the television series *Sergeant Preston of the Yukon* (CBS 1955-1958; rerun on NBC 1963-1964). His last role was in the 1977 television movie *Don't Push, I'll Change When I'm Ready*. Simmons began his career as a contract player for MGM studios and appeared in a number of films including *A Million to One* (1937) with Joan Fontaine. During his 40-year acting career he also appeared in *Lady and the Lake* (1946), *The Three Musketeers* (1948) and *Angels in the Outfield* (1951).

BOB STEELE, 91, (12-6-02) radio personality. Steele was host of WTIC(AM)'s *The Morning Watch*, later renamed *The Bob Steele Show*, from 1943 until he "retired" on October 1, 1991, 55 years to the day from when he started there. He continued to do the program the first Saturday of the month, except in December, January and February. Steele's last show aired on November 2, 2002. He joined the station, then owned by the Travelers Insurance Company, as an announcer in 1936 at a salary of \$35 a week. Steele was also the station's Vice President and Sports Director. In the early years of WTIC(TV), now WSFB, he doubled as an announcer and hosted *Close-Up on Sports*. Steele was inducted into the Radio Hall of Fame in 1995 and received the Marconi Award for top radio ratings.

A. PROSE WALKER, W4BW, 92, (8-8-02) FCC official. Walker was Chief of the FCC Amateur and Citizens Division from 1971 until 1975. He was responsible for proposing new am-

(continued on page 55)

A STRUCTURED APPROACH TO FIXING UP THOSE NICE OLD RADIOS

*Attending to a Family Heirloom:
The 1935 Model 630 Warwick Three-Band Tombstone*

During the mid-1930s, in the midst of the world-wide Great Depression, communications technology continued to move forward. It was driven, in no small part, by the almost insatiable demand of the consuming public for the inexpensive entertainment offered by radio listening. Somehow enough people found enough money to purchase updated receivers and keep the radio industry alive. I recall that some time early in 1936 my father brought home the radio described here, a three-band Warwick tombstone table set. The venerable AK small box 20 was retired, and a couple of AC-DC sets were relegated to other parts of the house.

Part of the romance of radio listening in the 1930s was the proliferation of short-wave broadcast stations. Now we could...and did...listen to overseas broadcasts from London, Rome, Berlin and South America, to name just a few. The large-sized "airplane" dial of the Warwick was adorned

with the flags of England, Italy, France, Germany (old Imperial, not Nazi), and Argentina. Backlit by the soft glow of its the paired lamps, the cream-colored dial held magic for a schoolboy whose interest in radio was beginning to develop.

This was a price-line radio, and I doubt that my dad paid over \$40 for it, new. The schematic diagram which I found fastened inside the set showed that the 1935 six-tube circuit was not very complicated. (*This schematic was not in good enough shape for clear reproduction here—ed*) Two unusual features are the use of a separate oscillator tube (type 76), and the use of a 6B5 in the audio stage. The latter is a combination driver/power output tube, with the driver stage directly coupled within the tube to the output triode.

Unusual physical characteristics are the massive 25-cycle power transformer and a band-switch where the leads are directly soldered to



Front and back of our old family friend: the 1935 Warwick Model 630.

**AUTHOR'S ADDRESS: RR 1, BOX 55, HENRYVILLE, PA 18332
e-mail w2dgb@enter.net**

the moving rotor. Other tubes included two 6D6s, a 75, and the 80 rectifier. Tuning ranges were standard BC, 500 to 1500 kHz, the "police band" (1.6 to 4.5) MHz (also marked in meters), and the short-wave band of 6 to 17 MHz.

The Warwick name is not heard very often, but if you will look in the Rider's indexes, you will see that they built a lot of radios. I could not find this particular set in Riders. The Model 630 listed there bears little resemblance to this radio. However, the original diagram that came with the set is labeled as covering the Models 630 and 635 and another model I could not determine.

Despite the relatively low price, some good features were built in. The tuning capacitor is a three-gang unit; as noted there is a separate oscillator stage; and by my count there are three stages of audio. The speaker is a Jenson Series R with a 1500-ohm field coil. A six-inch celluloid disc, driven by a pinch wheel, makes for positive tuning.

However, component quality was not of the best—not unexpected given the economy and relative inexperience of the manufacturers. One of the first parts to go was the AC switch on the back of the volume control. Some time later the power transformer failed with a glorious burst of smoke, and of course, some capacitors and resistors also had to be replaced.

Over the years I had repaired this radio, keeping it operating, sometimes with parts scrounged from old TV sets. A Stancor replacement took care of the power transformer, and a proper switch/gain control replaced the temporary fix for the broken AC switch. The original filter caps were replaced with a large can that just managed to fit under the chassis.

Finally, in the 1970s, with more parts available, I brought the old set back to good working condition. This year I went over it once more, replacing two questionable capacitors and discovering the source of a bandswitch intermittent. It seems that, over the years, the moving of the

bandswitch rotor back and forth led to a complete break of one of the attached moving wires. That was discovered only by using a strong light and a magnifying glass.

Some other notes. The primary of the power transformer is by-passed with a 0.05 mfd 400-volt capacitor. Current thinking is to by-pass both sides of the line with not more than 0.01 caps with at least a 1200-volt rating. Disc ceramics work well here.

The grid bias circuitry for the 75 detector/audio stage includes a small bias cell, a battery that failed decades ago. This was an innovation promoted by one of the battery manufacturers as contributing to better performance of the radio. The mounting is somewhat unique, and for this exercise I simply by-passed it with a lead directly to ground. The radio works fine without it.

Also, I detected some instability in the first IF transformer. The design of the times had both IF screens fed with one resistor and one 0.1 mfd bypass. I was able to tune out the instability, but if you run into a regenerative IF with one of your sets, don't be afraid to decouple each of the IF-tube screens with a separate resistor and bypass. And if you still can't find the problem, you can (carefully) take the IF transformers apart, examine them, and clean and repair as needed.

Two things I did not do here. Since the tubes seemed to be working, I didn't test them. Also, the alignment was not disturbed other than noted above. However, a good restoration job should include a realignment. The tuning capacitor gum-rubber mounting grommets are worn and should be replaced, and the cabinet should be cleaned and touched up.

Fortunately, the set had been taken care of over the years, and has survived pretty well—even through a couple of moves. The original wood knobs were still in place, and the cabinet was in decent shape. It was a family set, an old friend, and it was and is worth preserving. ☐

KEY AND TELEGRAPH, *continued from page 49*

the Vibroplex. Also, in these early months, he was known to give away many Vibroplexes in order to get them introduced at important offices.

Martin furthered his efforts at introducing the Vibroplex by entering into a price war with his two major competitors: Mecograph and Auto-Dot. In the spring of 1906, the Martin Vibroplex was being sold for \$12.00, the Auto-Dot for \$10.75, and the Mecograph model # 3 for \$10.00. By mid-summer, Martin had lowered his

price to \$7.50, but Mecograph countered this by lowering the price of all their models to \$7.50 including their newest model #4. Around the time of the Postal Telegraph evaluations Martin, most likely tired of dealing with the Mecograph Co., further lowered the price of his Vibroplex to \$5.00. It is hard to imagine he could operate in the black at this price.

Throughout his career, Martin was more preoccupied with achieving his goals than in mak-

ing a profit. In 1906, he was clearly "determined to place in every telegraph office in the United States and Canada at least one Vibroplex." In this he was clearly successful. Horace Martin has never really received the recognition and credit he deserves for his many accomplishments — especially for his efforts during these early years and the impact he had on the career of the average telegrapher.

During the World War II era, it was stated that wherever Morse was spoken in the U.S., and wherever Americans had traveled to speed up Morse transmissions throughout the world, a Martin Vibroplex was most likely being used. This seems a fitting legacy for the quiet and very modest telegrapher from Georgia.

I hope to cover other periods of Horace Martin's life in future articles. 

SOURCES FOR PARTS 1-3

1870 U.S. Census, Bartow County, GA.
City Directories: Bridgeport, Conn. 1902-03;
Brooklyn and New York City, NY 1897-1906

Martin family burial records
Fulton County Probate Court, Atlanta, Ga.
Certificate of Incorporation, United Electrical
Manufacturing Co., 2,17,1904
The Atlanta Journal, March 1, 1902
The Constitution, Atlanta GA. March 1&2, 1902
The Daily Times, Chattanooga, Tenn., May 17-19,
1905
Bartow History Center, Cartersville, GA.
Draft by Horace Martin Jr., *The Story of Rotoplex*,
1941
U.S. Patents by Horace G. Martin
Appleton's *Cyclopaedia of Applied Mechanics*,
1891
John B. Taltavall, *Telegraphers of Today*, 1893
James Parton, *The Life of Horace Greeley*, 1885
Oliver Gramling, *AP, The Story of News*, 1940
Telegraph Age
Telegraph and Telephone Age
Journal of the Telegraph
Interviews with Horace Martin's grandchildren:
James C. Martin, Charles Martin, Richard
Martin, Gena Van Camp, Stephen Van Camp,
Peggy Martin Flickinger, Gail Martin Kassel

OBITS, continued from page 52

ateur allocations at 10, 18 and 24 MHz during the International Amateur Radio Club meeting held in Geneva in 1972. Walker later chaired the Advisory Committee of Amateur Radio which prepared the proposal for presentation at the 1979 World Administrative Radio Conference (WARC-79). He was presented with a special achievement award at the Dayton Hamvention 2000 for his effort in obtaining the new amateur allocations.

FAY GILLIS WELLS, 94, (12-2-02) broadcast journalist. Wells began her journalism career reporting from Russia during the 1930s for *The New York Herald Tribune*, *The New York Times*, and Associated Press. In 1936 she married Linton Wells and began radio broadcasts from Latin America for *The Magic Key* of RCA. After completing an assignment for President Roosevelt and heading a commercial firm in West Africa she opened the Washington News Bureau for Storer Broadcasting Company in 1963. Wells served as Storer's White House correspondent from 1964 to 1977 and became the first female broadcaster accredited to the White House. She received the *American Women in Radio and Television 2001 Lifetime Achievement Award*.

THOMAS A. WYMAN, 73, (1-8-03) executive. Wyman was Chairman of CBS from 1983

until 1986 and President and Chief Executive beginning June 2, 1980. During his tenure CBS was faced with declining advertising revenues, hostile takeover attempts, a downturn in ratings and soaring debt. Wyman's proposal to sell the company to Coca-Cola lead to his resignation when it was blocked by William F. Paley, the founder of CBS, and Laurence A. Tisch, the company's largest shareholder. After leaving CBS he held other executive positions including a seat on the board of General Motors Corp. Prior to joining CBS he was President of Green Giant Company from 1975 until it was acquired by Pillsbury and he was named Vice Chairman of the conglomerate. Earlier he worked at Nestle for ten years before joining Polaroid in 1965.

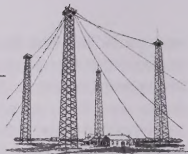
Information for this column was obtained from the *Big Bands* (4th edition), *The Complete Directory to Prime Network TV Shows 1946-present* (4th ed.), *The Encyclopedia of Jazz* (1st ed.), *The Hartford Courant*, *The Murrow Boys*, *On the Air: The Encyclopedia of Old-Time Radio*, *QST*, www.broadcastingcable.com, www.cbsnews.com, www.latimes.com, www.nytimes.com, www.rtnda.org, www.soc.american.edu and www.variety.com.

Thanks to Dr. E. E. Taylor and Dr. A. David Wunsch for additional source material. 

BELOW 535

EDITED BY **FRANK LOTITO, K3DZ**, 1428 O'BLOCK RD., PITTSBURGH, PA 15239

PLEASE INCLUDE SASE FOR REPLY.



DDH47 Commemorates 100th Anniversary of Marconi's Transatlantic Transmission

By Ray Soifer

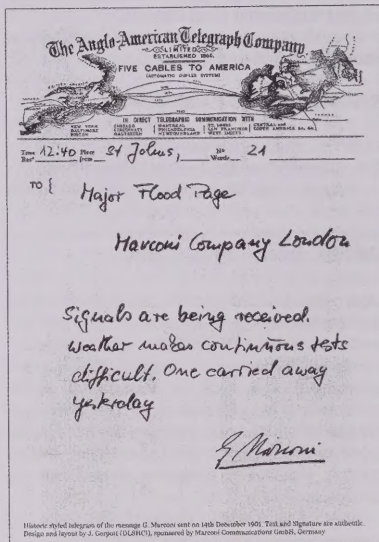
Ray's article recaps a unique SWL experience. He was fortunate enough to be in the right place, at the right time to hear, first hand, a unique amateur LF commemorative broadcast! Maybe you have had a similar experience. If so, you may want to share it with us!—FJL.

Utility station DDH47 is operated on 147.3 kHz by the National Weather Service of Germany (Deutscher Wetterdienst or DWD). It normally broadcasts weather reports on RTTY from its location at Pinneberg, near Hamburg (latitude 54.3 N, longitude 9.4 E). However, at 2230 UTC on December 12, 2001, the Amateur Radio Group of the German National Maritime Agency (DL0SWA) used DDH47 to transmit a special bulletin in Morse code to commemorate the 100th anniversary of Marconi's first successful transatlantic test. The message invited listeners to send reception reports to Marconi Communications GmbH in Hamburg.

I learned that this event was to take place from the 425 DX News, a weekly Italian bulletin (thankfully available in English) intended primarily for HF DXers but which also frequently carries news of forthcoming LF and VLF events such as this. The 425 DX News is commonly available on DX PacketClusters and amateur packet radio bulletin boards (ask your local sysop) and may also be subscribed to (free) on the Internet by going to <http://www.425dxn.org/425.html>.

News on VLF and LF activities, including special event stations, can also be found on the following sites: Radio Society Of Great Britain, <http://www.rsgb.org>; Long Wave Club Of America, <http://www.lwca.org>; AMRAD, <http://www.amrad.org>.

My business frequently takes me to the United Kingdom, and at the time of the broadcast I was staying at the Travellers Club in London. One of my most helpful traveling companions is my Sony ICF-SW100E receiver, which despite being only 3x4 inches in size covers all modes — CW, USB, LSB and AM both with



Author's copy of reproduction of the Marconi "signals received" telegram sent to those who verified reception of the commemorative message.

and without synchronous detection — from 150 kHz to 30 MHz plus the FM broadcast band. Tuning steps are as small as 100 Hz. It serves as my alarm clock and source of music and news.

In the HF amateur bands, the receiver is even sensitive enough that I've used it to make satellite contacts via RS-10/11 and RS-12/13 (December 1996 *QST*, p. 52). In the evenings, in London, it picks up stations from all over Europe on the LF broadcast band with its built-in

**AUTHOR'S ADDRESS: W2R, 60 WALDRON AVENUE, GLEN ROCK, NJ 07452
PLEASE INCLUDE SASE FOR REPLY.**

ferrite loopstick. On HF, it uses a built-in collapsible whip, with provision for an external wire if desired. The ICF-SW100E is the European version of the ICF-SW100S sold in North America, the same radio but without the latter's active antenna accessory.

The transmitting antenna at DDH47 is a "T" 240 feet high, but I'm not sure about the power output. The bulletin itself states 20 kW, but the DWD Web page (<http://www.dwd.de/services/gfsf/bdcast.html>), which has nice photos of the station and operators, says 15 kW. Perhaps they run the station at 15 kW on RTTY but crank it up to 20 kW on CW.

That is still far less power than is generally used by European LF broadcasters. BBC Radio 4 on 198 kHz, which I can sometimes hear weakly in New Jersey when conditions are just right, puts out 500 kW; the German station Europe No. 1, on 183 kHz, runs 2000 kW and Radio Rossii in Moscow, on 261 kHz, tickles the tooth fillings at 2500 kW.

Naturally, I wanted to see if I could copy the DDH47 special Marconi bulletin on 147.3 kHz. Since the Sony does not tune below 150 kHz, I set it for that frequency, switched to the LSB position, and listened for a 2.7 kHz beat note. It worked! The Marconi bulletin was solid copy, RST 579, on the ICF-SW100E with its internal loopstick while sitting in my room in London, 440 miles distant.

The bulletin itself was interesting. Here is the text, as posted by jim <mail@sideband.fsnet.co.uk> on the WUN Utility SWL Dxing Internet Reflector (see www.wunclub.com).

*cq de ddh47 Spc bcst in English, Italian, German French and slow telegraphy at end of bcst.
- nw english -*

To all stations and friends of wireless radio worldwide, this special broadcast comes to you by courtesy of the National Weather Service of Germany to remember the first wireless transmission across the north Atlantic by the Anglo-Italian pioneer Guglielmo Marconi on December 12th 1901 from 12 hours 30 on, he and his employees George Kemp and Percy Padget received the Morse code signals about 25 times. The receiving station was erected in a building on Signal Hill in the vicinity of the harbour of St. Johns Newfoundland. This place is the easternmost place of the American continent. The Morse code signals have been produced by a spark transmitter of 12 kW at the station Poldhu near Lizard in Cornwall, SW England. The next day tests were repeated but had been not so successful. Marconi cabled to his company in London quote 'Signals received' unquote. The first long distance wireless communication became re-

ality. Get a free copy of an historic styled telegram on this occasion by sending a postcard with your address and keyword 'Marconi' to: Marconi Communications GmbH, Nagelsweg 55, D20097, HAMBURG. This broadcast came from National Weather Service of Germany, Deutscher Wetter Dienst over Tx at Pinneberg DDH47 on 147,3 kHz 20 kW QTH 54.3 North 9.4 East. Amateur Radio Group (DL0SWA) of National Maritime Agency: Bundesamt fuer Seeschifffahrt und Hydrographie and Deutscher Wetterdienst. CW telegraphy for ever. Good luck.

Nw Italian

The same message then followed first in Italian, then in German and French. After the bulletin was transmitted in the four languages, DDH47 began a series of transmissions in very slow Morse (3-second dits) to see if anyone in North America could copy. Unfortunately, the time of day, determined by the weather broadcast schedule, was somewhat early for LF transatlantic propagation; at this writing, I was unable to unearth any such reports.

If you'd like to hear the sound of DDH47 for yourself, a portion of a similar Morse bulletin on a previous occasion, the 100th anniversary of German maritime radio on November 12, 1999, is on the Web at <http://www.sweb.cz/ok1fig/ddh47wav>. Petr Maly, OK1FIG, has many other interesting LF and VLF sounds there, too, including an Alexanderson alternator transmission from SAQ.

To quote the bulletin, "CW telegraphy forever."

NEW LF HAM ALLOCATION SOON?

Keep an eye on the pending FCC approval of a formal LF amateur radio assignment centered on 136 kHz. It might have already happened by the time this issue is out. Another amateur allocation at 160-190 kHz is also under consideration but might be tabled because of comments filed by the electric power industry.

The easiest way to stay abreast of the latest developments on the formal assignment of LF amateur radio privileges in the US, Mexico and Canada is to periodically check the "news columns" on the following web sites:

Long Wave Club Of America:

<http://www.lwca.org>

American Radio Relay League:

<http://www.arrl.org>

Radio Society Of Great Britain:

<http://www.rsgb.org>

—Frank J. Lotito K3DZ

NEW BOOKS AND LITERATURE



DAVID W. KRAEUTER, 506 E. WHEELING ST., WASHINGTON, PA 15301 E-MAIL KRAEUTER@SGI.NET
PLEASE INCLUDE SASE FOR REPLY.

Books to be reviewed in this column should be sent directly to David Kraeuter at the address above. After review, all such books become a permanent part of The AWA Library, which is located at The AWA Electronic Communication Museum and is available to members for browsing and research.

A. Atwater Kent: The Man, the Manufacturer and His Radios

By Ralph Williams and John P. Wolkonowicz. Edited by Donald O. Patterson. Published 2002 by Sonoran Publishing, LLC, 480-961-5176, www.greengatebooks.com. 8½ x 11 inches, 108 pages, softcover, \$25.95.

Another beauty from Sonoran, this book is largely an adaptation from a series of articles Williams wrote for *Radio Age* beginning in 1976. The original articles are no longer in print, so this makes a handy compilation of material not otherwise available. It includes a 12-page essay, "Worcester Polytechnic Institute's Forgotten Millionaire" by John P. Wolkonowicz.

About half the book is devoted to the breadboards, and many of these have circuit diagrams and monochrome photographs of the top and bottom of the boards. There are also three pages of color photographs, mostly of AK advertising items.

Williams obviously knew his subject thoroughly, even in the "dark ages" of radio history (the 1970s). So it's not surprising that he doesn't hesitate to state his opinions about AK matters for which there may be little or no direct evidence today. See, for example, his perceptive discussion on page 20 of Kent's reluctance to embrace the regenerative or reflex circuits in his radios.

Another typical insight by Williams appears on page 19 in a paragraph about the low audio output of Model 10 breadboards:

In the days when AK instruments were new, radio was so novel, so uncommon, and so expensive in both money and time, that it was accorded the quietness of surroundings that made hearing by a group possible, even with the limited volume available.

The all-AK *AWA Review*, volume 12, 1999 may be considered a companion volume, since it is also by this master AK historian, Ralph

Williams. AK enthusiasts will want to own both. See the November 1999 *OTB*, page 64, for a review of volume 12.

Words at War: World War II Era Radio Drama and the Postwar Broadcasting Industry Blacklist

By Howard Blue. Published 2002 by Scarecrow Press, Inc., 800-462-6420, www.scarecrowpress.com. 4½ x 8½ inches, 407 pages, hardcover, \$34.95.

This book follows a dozen or so lives in radio through two distinct phases—the heyday of polemical writing and radio drama between 1936 and 1945 and the distinctly-soured postwar radio atmosphere in the days of McCarthyism.

In attempting to explain how the war of words originated, the author provides a recipe, literally, which includes such ingredients as the advent of radio and the radio drama concept, FDR's New Deal propaganda broadcasts, Orson Welles' broadcast of "The War of the Worlds," and, of course, World War II. Combined, these factors and others produced a vigorous war of words directed against fascism, Nazism, and Japanese war efforts. Blue states: "In 1940, more than 10,000 hours of drama were broadcast over the air. This represented more than 30 percent of the available air time."

But soon after the war ended, in an ironic reversal of fortune, the war of words was turned against these same idealistic drama writers and producers. Their liberal views in defense of democracy and human rights went out of fashion in an American society now thought to be riddled with communism at all levels. The shenanigans of the McCarthyites revealed in the last two chapters are difficult to fathom, particularly after the civil rights protests and advances of the 60s and 70s.

The book is extensively researched and documented, with notes, bibliography and index.

Tesla: Man Out of Time

By Margaret Cheney. Published 1981; reprinted by Dell Publishing 1998, available at www.amazon.com. 5¼ x 8 inches, 393 pages, softcover, \$15.00.

This is the second of three full-length Tesla

biographies. Tesla's first major biographer was his friend John J. O'Neill, whose *Prodigal Genius: The Life of Nikola Tesla* appeared in 1944, the year after Tesla's death. Thirty-five years later Cheney had fuller access to primary and secondary sources for her biography. See also Marc Seifer's *Wizard: The Life and Times of Nikola Tesla*, reviewed in the May 2002 *OTB*, page 52.

One of the many mysteries of Tesla's life is the whereabouts of some of his scientific papers, which initially went to the U.S. Office of Alien Property. In a postscript Cheney writes that "a substantial classified Tesla file" wound up in a defense research agency, but tantalizingly she does not identify the agency.

It seems one cannot write about Tesla in depth without becoming involved in mysteries. For example, Cheney repeats the story of Tesla's experimentation with his "telegeodynamic oscillator," a small engine Tesla said could be carried in his pocket and which operated via compressed air. Tesla claimed great destructive possibilities for the device through the use of resonance. "So powerful are [its] effects," Tesla said, "that I could now go over to the Empire State Building and reduce it to a tangled mass of wreckage in a very short time" (O'Neill, page 165).

Is this claim realistic? If so, the demolition industry should be informed. Why tolerate the expense, labor and danger of using high explosives when one could merely "attach a small mechanical oscillator" to the appropriate I-beam and wait a few minutes?

Cheney's and Seifer's biographies are modern, first-class works; the O'Neill biography was written from first-hand experience but is dated. All three are fascinating reading, due in no small part to their subject.

John Logie Baird: A Life

By Antony Kamm and Malcolm Baird. Published 2002 by National Museums of Scotland Publishing, available from Weatherhill, Inc., 1-800-437-7840, 6 1/2 x 9 1/2 inches, 465 pages, hardcover, \$39.95 (US).

What do you think of first when you hear the name John Logie Baird? Mechanical television. But the adjective should not be allowed to overshadow the noun. Baird, as an inventor of television—perhaps the inventor of television—may have started out with primitive cardboard equipment. However, during his relatively short lifetime he saw television through to electronic scanning on a patented color CRT of his own invention. Baird's life was characterized by genius, struggle, ill health, limited commercial success and great creativity.

Now Baird's son and Antony Kamm have provided us with a richly-detailed life of the inventor, ready to take its place beside Russell Burn's biography (see *OTB*, November 2001, pp. 27-8). It is obvious from the finished product that an enormous amount of work went into the creation of this outstanding book. Two examples will suffice to show the extent the authors went to in ascertaining the facts of Baird's life. Baird's television career started in the town of Hastings in 1923. In attempting to determine exactly where Baird lived at this time, the authors consulted Baird's memoirs, city directories and even electoral rolls. They conclude, nevertheless, that the exact location could not be determined.

Baird's career (and life) ended in Bexhill in Sussex, not far from Hastings. The authors tell us that when television finally came to Bexhill years after Baird's death, reception was "consistently reported to be bad." But Baird and Kamm are not content to let the matter rest there; one of the book's 1100 endnotes informs us, with dated documentation, that reception in that area today still requires a booster.

Other niceties include a genealogical chart of the Baird family, an appendix detailing Baird's involvement with the supernatural, and a bibliographic essay comparing various copies of Baird's autobiography. There are 60 monochrome photographs, many of which are published here for the first time. All are captioned as meticulously as the book is written. My favorite is of Baird, indoors, "...in an overcoat to combat the chill of August in Berlin...."

John Logie Baird obviously will be welcomed by Baird enthusiasts as well as television historians. But it undoubtedly will also be profitably used by anyone who enjoys reading biography or anyone who wants to see how good biography is done. Highly recommended.

ALSO NOTED

R. Angus Buchanan, *Brunel: The Life and Times of Isambard Kingdom Brunel*. London and New York: Hambledon and London, 2002, 294 pages.

Richard Moran, *Executioner's Current: Thomas Edison, George Westinghouse, and the Invention of the Electric Chair*. NY: Alfred A. Knopf, 2002, 271 pages.

Bruce Schechter, *My Brain Is Open: The Mathematical Journeys of Paul Erdős*. New York: Simon & Schuster, 1998, 224 pages.

George Paul Csicsery, *N Is a Number: A Portrait of Paul Erdős*. A documentary film, 1993, 57 minutes.

GUGLIELMO MARCONI: CREATING WIRELESS TELEGRAPHY

In spite of all that has been written about him, Guglielmo Marconi remains a rather remote and shadowy figure. Part of the difficulty in understanding this man lies in the fact that he lived in another time and place. It was the Victorian era — a time of heroic inventors, notable engineers, and famous scientists. It was the age of empire, sea travel, and communications technologies that included the telephone, telegraph, and submarine cables.

It was also an age when self-taught people could still achieve great things. Vision, drive, ingenuity, and determination often counted for as much as formal academic credentials. Some individuals rose from obscurity to achieve fame and fortune in that era; Marconi was one of them.

Early History

Marconi was born in 1874 in Italy. His father was a financially well off, provincial Italian landowner. He was a widower when he married a much younger Irish woman, who became Marconi's mother. She came from a wealthy family, who made their money in the distillery business. Her parents were not happy about the marriage a much older foreigner. Nevertheless, they accepted it.

Both of Marconi's parents were intelligent and fairly well educated; however, neither held university degrees. Marconi's father was an astute businessman. He was a good steward of his land holdings and financial resources. He was a serious person who did not tolerate foolishness.

Marconi's mother was a romantic person. However, she also had drive and determination, which she amply demonstrated by marrying Marconi's father against her family's wishes. She adored her son and played a large part in his education, which was eclectic, erratic, and geographically dispersed.

Marconi's primary school education was obtained through tutoring from his mother, hired tutors, and formal classroom settings in Italy and England. After finishing primary school, he enrolled in an Italian technical secondary school but

never graduated. This prevented him from pursuing a university degree or entering the Italian Naval Academy.

Marconi was interested in telegraphy, and he learned about it from an old, blind, retired, Italian telegrapher. Marconi was also good with his hands and liked to tinker with electrical devices. This would all play an important role in his later work.

In 1894, at the age of 20, Marconi was a relatively uneducated young man, who had been leading a rather privileged and undemanding life. Also, he was shy and insecure; he often thought that people greatly underestimated his intelligence. His father saw him as drifting aimlessly through life with no goals or sense of direction. But this changed suddenly when Marconi decided to turn a laboratory apparatus into a means of wireless telegraphy.

It is difficult to know exactly what motivated Marconi and fired his youthful imagination. It may have been a desire to reward his mother's faith in him. He may have also wanted to show his father that he could accomplish great things. Whatever the reasons, Marconi's decision would ultimately revolutionize the world in which we live. Nevertheless, the boy was setting out to do a man's job, and it would be a difficult task.

Existing Laboratory Apparatus

The laboratory apparatus that captured Marconi's imagination had been used by scientists to create and detect electromagnetic radiation across open space. In the middle of the 1860s, the theoretical existence of electromagnetic radiation was proposed. Scientists thought light was a visible form of this radiation. Other invisible forms of this radiation were also thought to exist.

In the late 1880s, scientists developed methods to both generate and detect invisible electromagnetic radiation. The equipment that generated this radiation utilized a battery, induction coil, two metal plates, and a spark gap. Detecting this electromagnetic radiation was originally done by means of a wire ring with a gap across which a received spark could be seen. (*Note: this ring and*

gap was the inspiration for the AWA's well-known logo—ed). Later on, detection was by a coherer, which was a small glass tube filled with metal filings. When an electromagnetic wave from the spark generator was detected, a coherer showed increased conductivity.

By the 1890s, scientists were using this laboratory apparatus to create very high frequency short waves for experimentation and research work. These waves would propagate for only a few hundred feet, which was quite suitable for laboratory work but of no value for long distance communications. Scientists thought of these waves in analogies related to light waves, which are another form of electromagnetic radiation. Their experiments with these waves involved reflection, refraction, and polarization.

Through his self-study and private tutors, Marconi learned about this laboratory apparatus. However, he saw it from a telegraphy perspective—rather than the optical (light) perspective of the scientist who used it in the laboratory.

Marconi believed that this laboratory apparatus could be the basis for long distance wireless telegraphy. At the time, there was no scientific or theoretical reason for him to believe in the possibility of long distance communications. Since he was a realist, his belief had to be based on more than just wishful thinking. In part, it may have been based on his knowledge that a coherer connected to a kite could be used to detect distant lightning storms. Perhaps he believed that this indicated the possibility for signals to travel long distances. Whatever the reason, late in 1894, Marconi became a young man on a mission.

Marconi's Creation

Marconi began his experimentation in the attic of his family home in Italy. The first thing he did was to build his own laboratory apparatus to better understand its basic capabilities. He quickly realized that existing coherer designs were problematic. The sensitivity of the device left a great deal to be desired. To deal with this problem, Marconi experimented with different metal filings until he found a combination that greatly improved the performance of his instrument.

Another problem with the coherer was the need to continually tap the device to separate the metal filings after every detection of a spark transmission. Marconi significantly improved this process by creating an electrical "tapper" that automatically restored the coherer filings for the next reception of a spark signal. Adding a Morse telegraph ink to record what was received further improved the capabilities for

communications work.

Throughout the ongoing days, weeks, and months, Marconi's mother totally supported his work; she thought that he would accomplish something great. His father, however, was not impressed; he thought his son was wasting time and money on a foolish dream. Probably to placate his wife and keep peace in the family, he grudgingly tolerated his son's activities and even provided some money for Marconi to buy equipment. Nevertheless, this was a tense period in the Marconi household.

Marconi knew that, for his ideas to be of any commercial value, he had to be able to create spark signals that could be received over long distances. To extend the range of his equipment—probably by analogy with wired telegraphy practice—he conceived of the idea of connecting one of the metal plates from his spark generator's induction coil to an earth ground. He also elevated the other metal plate from the coil to create an antenna. The result was the generation of longer electromagnetic waves that would propagate over much greater distances.

Marconi also connected one side of his coherer receiving apparatus to the earth. The other side of his coherer was connected to an elevated antenna. This arrangement provided symmetry with the spark generator. The coherer apparatus was placed outdoors and moved farther and farther away from the spark transmitter, as the inventor worked to extend the range of his equipment.

Marconi worked tirelessly to perfect his apparatus; it was not an easy task. He was not able to discuss his idea with other technical people because of concern that they might also try to create wireless telegraphy. In addition, he was under tremendous self-imposed pressure to succeed; with Marconi failure was never an option.

Gradually, through slow, painstaking work that extended over a period of many months, Marconi increased the transmission range of his equipment to nearly two miles. He was also able to receive signals on the far side of a hill. By the fall of 1895, at the age of 21, Marconi had achieved practical wireless telegraphy; the boy had succeeded at a man's job.

Conclusions

Marconi applied for an English patent on his invention in 1896 and it was awarded in 1897. The patent was for the utilization of known scientific knowledge in new ways for establishing commercial wireless communications. It was not for the basic scientific research, which had already been performed by others. It was a broad,
(continued on page 63)

About Our Authors

HENRY M. BRADFORD

Did Marconi Receive Transatlantic Radio Signals in 1901?—Part 2

Henry's high-school interest in radio led him to college studies in physics, and he eventually became a Ph.D. in solar radio astronomy. His interest in early radio began after learning of the three Marconi Station sites at Cape Breton, Nova Scotia, where he was teaching. (See his articles: "Celebration of 100 Years of Radio in Cape Breton," *The OTB*, Vol 36, No 4, "Marconi's Three Transatlantic Radio Stations In Cape Breton," *Journal of the Royal Nova Scotia Historical Society*, Vol 1/98, the two-part article "The Cape Breton Stations of the Marconi Transatlantic Radio Service" that appeared in earlier "Below 535" columns [*The OTB* Vol 41, Nos. 3 and 4] and another "Below 535" article [*The OTB* Vol 42, No. 3] "The Marconi Transatlantic Wireless Receiving Station at Louisbourg, Nova Scotia, Canada").



BUFORD CHIDESTER

Boudette Manufacturing Co: The Sonochorde Family of Cone speakers (in "Radio Reproducers")

As a youngster Chidester spent many long hours watching his dad make repairs to radios, televisions and other electrical devices. After graduating from high school, he joined the Air Force and served his time in the civil engineering division at locations from Texas to the northern glaciers of Iceland. In the mid 1960s he landed his first civilian job with RCA in Lancaster, Pennsylvania. His duties at RCA included assisting in test set design for new products such as color television picture tubes, general purpose and super power tubes, scope tubes and most interesting of all, camera tubes for the Apollo program.

Later, he was employed at M & M Mars in Elizabethtown, Pa. designing electrical control systems for candy manufacturing. Following that, he was employed by PES Industrial Refrigeration Systems designing and developing computerized control systems for the chemical, pharmaceutical and food industries, specializing in control systems for hazardous installations.

In the early 1990s, Chidester's early interest in the antique radio hobby was renewed. He and his wife Jane began to research, document and collect all types of 1920s-era cone speakers. This led to the release of their book *Classic Cones:*

Pictorial Reference and Value Guide For 1920s Radio Cone Speakers, released December 2001 by Sonoran Publishing, Chandler, Arizona.



CARLOS FAZANO, ZZ2KFZ

Restoring a Preamp From the Golden Age of Hi-Fi

A lifelong enthusiast of high-quality sound reproduction, shortwave listening and ham radio, Carlos' involvement in electronics began with the building of radios and audio amplifiers. He holds a degree in chemistry and has published two books on laboratory instrumentation but, in spite of his professional activities, has always found time for studying the evolution of electronic technology. Carlos has published several articles relating to antique radio in international and national magazines and journals, including *The OTB*.



JIM HANLON, W8KGI

The 1945 Hammarlund HQ-129X (In "The Communication Receiver")

Jim was born in Cincinnati in 1938 and first licensed as WN4VIV from Fort Thomas, KY in 1952. He earned BEE, MS and Ph.D. degrees in Electrical Engineering from The Ohio State University where he also taught EE for four years. He worked for Bell Telephone Laboratories for 25 years and transferred to Sandia National Laboratories in Albuquerque where he is currently a Principal Member of Technical Staff. Jim is one of the sponsors of the "Classic Exchange" old-time equipment contest, and at any given time he has about two dozen transmitters and receivers ready to go on the air. Jim is a member of the ARRL, QCWA and AWA, and he has had many articles published in *Electric Radio* magazine.



DR. HUGO HOLDEN, BHB, MBChB, FRACO
Restoring a HMV 904 — Part 2 (In "Television")

Hugo is a New Zealand trained Doctor and Ophthalmologist, currently practicing his specialty on the sunshine coast in Queensland, Australia. He started out in electronics engineering, and often visited the late John Stokes' radio shop as a boy. It was close to the home where he grew up in New Zealand. Dr Holden changed to medicine in the early 1980s. Keen on vintage electronics, he has collected a number of interesting items, ranging from pre-war television sets, to germanium transistor communications receivers

of the 1960s along with some early TTL equipment from the 1970s.



FRANK J. LOTITO, K3DZ

A Collage Of Ideas Transmitter

Frank has a BS in electrical engineering, but for most of his 30-plus-year working career has primarily done mechanical engineering from a quality point of view for a large international safety equipment company. He has held the call K3DZ for over 20 years, and also possesses an FCC General Phone license with radar endorsement.

He has been a home brew enthusiast from the start of his interest in amateur radio. His projects have run the gamut from modern solid state VHF and UHF FM synthesized transceivers to designs going back to the early 20s. Frank is most definitely a strong proponent of the "file to fit—fit to file" use whatever you have in your junk box school.



RAY SOIFER, W2RS

DDH47 Commemorates 100th Anniversary of Marconi's Transatlantic Transmission (In "Below 535")

Ray Soifer has been a licensed radio amateur since 1955. Retired from a career in international investment banking, he now has his own consulting practice serving global financial services companies. A longtime officer and director of the Radio Amateur Satellite Corporation (AMSAT), he currently holds the position of Vice President for International Affairs. Ray is a member of the DXCC Honor Roll and enjoys working DX, especially on CW, on all bands from 160 meters to VHF/UHF moonbounce. He credits the late Robert Morris, W2LV (ex-2CQZ), and Brother Patrick Dowd, W2GK, with getting him interested in the history of radio and AWA, is an active participant in AWA QSO Parties and a Fellow of the Radio Club of America.

JOE STEPHANY, N2XS

Haiku Radio Station and the Alexanderson Alternators.

Joe is a retired Physicist. He joined the Navy after high school and attended college afterwards, earning an MS degree. He then worked in the research departments of Kodak, Stromberg Carlson, General Dynamics, Xerox, and Clevite (the former Brush Development Labs) where he had 24 major publications in leading physics journals and was issued 27 U. S. Patents.

Joe has held the calls KH6BDU and K2KSJ, and is now N2XS. He also holds a commercial Radiotelephone and Radar license. Since his retirement, he continues his explorations into fluctuation phenomena in semiconductors and these results have appeared in *The Journal of Physics*, *The Journal of Applied Physics*, *The Bulletin of the American Physical Society*, and *The Physical Review*.

He also is a reviewer for the *Physical Review*, the *Physical Review Letters*, and the *European Physics Journal*. This is the third time he has written for *The OTB*. Articles by his son Nolan, N2EAW, who is Assistant Chief Engineer at WXXI-TV in Rochester, have also appeared in *The OTB*.



RONALD R. THOMAS, W8QYR

Guglielmo Marconi: Creating Wireless Telegraphy

Ronald Thomas is a communications specialist who has written over 100 articles and two books on telecommunications. He holds an Extra Class Amateur Radio License, a Second Class Commercial Radiotelegraph License and a First Class Commercial Radiotelephone License. Thomas served as a Communications Electronics Officer, with rank of Captain, in the U.S. Air Force at Cape Canaveral. He received a Bachelor's degree, with honors, from Youngstown University and a diploma in Advanced Communications Engineering from the Cleveland Institute of Electronics. 

GUGLIELMO MARCONI, continued from page 61

overarching patent, which would help to ensure the commercial success of Marconi's ventures.

Several more years of hard work would be required for Marconi to extend the range of his equipment to approximately 200 miles and make it truly suitable for commercial work. Then, in 1901, his wireless signals spanned the Atlantic, from England to North America. Marconi was

on the way to fame and fortune.

In his lifetime, Marconi would receive many honors and awards, including a Nobel Prize, and achieve tremendous success. Yet, some people continue to be amazed that an obscure Italian youth could have come from out of seemingly nowhere to achieve so much and have such a great impact on the world in which we live. 

DID MARCONI RECEIVE TRANS-ATLANTIC RADIO SIGNALS IN 1901?

Part 2 (conclusion): The Trans-Atlantic Experiments

We apologize for not mentioning in February that the installment of this article published then comprised only Part 1 and that the second and final part would follow in this issue.—MFE

On December 11, 1901, Marconi and his party used balloons to support the receiving aerial wire which was about 500 feet long. According to Marconi's assistant, George Kemp, "Marconi tried all the detectors from time to time" until a heavy gust of wind blew the balloons away, ending the day's experiment. "Signals appeared at intervals on a telephone in series, when using our sensitive tube (coherer) circuit, and, at times, the dots threatened to appear on the tapper." [8]. The receiver was the syntonic (tuned) type.

On December 12, a kite was used to support the aerial wire, and Marconi switched to the untuned receiver because the erratic changes in elevation of the kite made tuning the aerial too difficult. Later, in a recorded address, Marconi said that he "tried various microphonic self-restoring coherers placed in the secondary circuit of a transformer, the signals being read on a telephone. In many cases a succession of S's being heard distinctly (also heard by Kemp) although, probably in consequence of the weakness of the signals and the unreliability of the detector, no actual message could be deciphered. The coherers which gave the signals were one(s) containing loose carbon filings, another designed by myself, contained a mixture of cobalt and carbon filings, and thirdly the 'Italian Navy Coherer,' containing a globule of mercury between two (conducting) plugs" [4].

Marconi recorded in his diary: signals received at 12:30, 1:10, and 2:20 Newfoundland time [2]. Marconi said later "At 12:30 p.m., while I was listening on the telephone receiver there came to my ear, very weakly, but with such clarity that there could be no possible doubt, a rhythmic succession of the 3 dots corresponding to the letter "S" of the Morse code..." [4]. Some signals also were received December 13 during the brief time that a kite could be kept aloft.

When Marconi announced his reception of trans-Atlantic radio signals to the world, the Anglo-American Telegraph Company, which held a monopoly on telegraphy in Newfoundland, threatened court action if Marconi continued his wireless work there. That ended trans-Atlantic radio experiments in Newfoundland. His announcement of success met with some scepticism, especially in England, based on preconceived notions about radio waves travelling in straight lines.

To counter this and fully satisfy the Board of his company, his next long range experiment was carried out on a voyage from Britain to New York aboard the *SS Philadelphia* in February, 1902. In this experiment, he continually monitored signals from the Poldhu transmitter, which was unchanged and still operating at a nominal 820 kHz (366 metres).

Judging from Kemp's description, the receiving antenna was a four-wire horizontal cage about 150 feet above the deck [8]. A syntonic (tuned) receiver was used. Morse code messages were received to a maximum range of 700 miles during the day and 1550 miles at night. The repeated Morse letter S (the test signal used in the Newfoundland experiment) was received up to about 2100 miles at night, approximately the distance from Poldhu to St. John's. Marconi tested the range of the Poldu station again in 1902 on voyages aboard the Italian naval vessel *Carlo Alberto*, presumably with a tuned receiver. The results were consistent with those obtained on the *SS Philadelphia*.

During a summer voyage around the European coast, signals were received about 1600 miles from Poldhu at night (not necessarily the maximum range), but only to about 500 miles by day. On an east-west trans-Atlantic voyage in October, signals were received right into the harbour at Sydney, Nova Scotia at night, at a reported wavelength of 1100 metres (about 273 kHz). Although these voyages vindicated Marconi as far as proving that trans-Atlantic radio communications were possible, they indicated that they could only be made at night at wavelengths of hundreds

of metres, raising questions about the daytime experiment in Newfoundland.

Marconi was finding by trial and error that better results were obtained at longer wavelengths. He used a wavelength (at least sometimes) of 1650 metres (about 182 kHz) at his first trans-Atlantic station at Glace Bay, but still was confined to intermittent night-time operation. When he finally opened a commercial trans-Atlantic radio service in 1907 between another station near Glace Bay ("Marconi Towers") and Clifden, Ireland, he was using a wavelength of about 5000 metres (60 kHz). This provided reliable daytime communications and usable, but more variable night-time communications.

What does all this tell us about the first trans-Atlantic experiment between Poldhu and St. John's? Firstly, all the results obtained with tuned receivers were at least qualitatively consistent with modern experience and knowledge about radio propagation, although the long ranges obtained with such primitive equipment might come as a bit of a surprise to the reader [9]. Though daytime ranges at 820 kHz were limited to several hundred miles, the night-time ranges were several times longer.

The fact that no definite signals were received at St. John's on the tuned receiver (December 11) is no surprise to broadcast band listeners, and is consistent with radio propagation theory. According to the Austin-Cohen radio propagation formula [10], the daytime field strength at 820 kHz at St. John's would have been about 1/1500 of the field strength at the maximum daytime range achieved in the *SS Philadelphia* experiment.

The only result that seems inconsistent with modern knowledge was the claim of daytime reception of the 820 kHz trans-Atlantic test signal at St. John's on December 12, which was made with an untuned receiver. It has been suggested that Marconi may have mistaken atmospheric interference ("static") for the three dots of the letter S repeated continuously. I doubt this because Marconi was an experienced radio listener, and his description of the event, quoted above, sounds very convincing.

Assuming then that he did hear the test signal, the most reasonable explanation is that his untuned receiver detected it at some frequency or frequencies other than the nominal transmission frequency of 820 kHz. Spark transmitters were notorious for their broadband emissions, and it is quite probable that the spectrum of the Poldhu transmitter contained significant power in the HF (short wave) band. [5].

Propagation curves indicate that the daytime strength of a 7.5 MHz signal at St. John's would

be about six times greater than the field strength of a 820 kHz signal 700 miles from a source of the same power (the maximum daytime range in the *SS Philadelphia* experiment), if ionospheric absorption is neglected [11]. However, only a fraction of the broadband HF spectrum of the Poldhu transmitter would likely reach Newfoundland; the ionosphere would absorb all of it except for a band a few MHz wide below the maximum usable frequency (MUF), which would have been about 12 MHz.

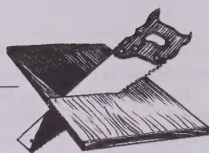
Add to this a host of more uncertain factors such as the relative performances at 820 kHz and HF of the transmitter, the antennas, and the receivers, and about all you can say is that spurious HF radiation from the Poldhu spark transmitter provides the most plausible explanation of the first trans-Atlantic radio transmission. Ironically, improvements in tuning prevented this from happening again in trans-Atlantic work, and the potential of short wave for long distance communications was not realized for another two decades. 

REFERENCES AND ENDNOTES

- 8) Kemp, George, "Extracts from the diary of G. S. Kemp," Vol. 3., *Marconi Archives*, Marconi plc.
- 9) Typical ranges for shipborne 1.5 kW spark transmitters and receivers of the early 1900's (no electronic amplification) were a surprising 100 nautical miles at 1 MHz, and 185 nautical miles at 150 kHz. Factors contributing to such good results with such primitive equipment probably were: large receiving antennas with good ground connections to the hull of the ship, resulting in low antenna circuit losses; propagation over salt water; and the large impulsive power of a spark transmitter.
- The voltage-controlled coherer detector was well suited to detection of the peak signals provided by the spark transmitter impulses. Ratcliffe (Reference 5) estimates the RF power output of the Poldhu transmitter during the damped wave spark impulses to have been a few tens of megawatts, whereas the average power input was only 35 kilowatts! This large ratio of impulse power to average power was due to the spark being produced by the relatively short discharge of a capacitor.
- 10) P. David and J. Voge, *Propagation of Waves*, Pergamon Press, 1969.
- 11) Bremmer, Dr. H., *Terrestrial Radio Waves*, Elsevier Publishing Co., 1949.

BREADBOARDING

EDITED BY **DICK PARKS**, 2620 LAKE RIDGE CT., OAKTON, VA 22124
E-MAIL: DPARKS@EROLS.COM. PLEASE INCLUDE SASE FOR REPLY.



*Bring Historical Circuits to Life
On Your Workbench!*

The Return of the Spherical Audion

Wouldn't it be nice if they began making audions again? When DeForest contracted the manufacturing of his first audion triodes to one McCandless, who was making light bulbs in his New York factory, the selling price was down around eight or ten bucks. In today's money that equates to something like \$180. What if you could buy one for just about \$100.00 today? Search no more. A brand new spherical "audion" is now available over the Internet!

I stumbled across the British source, "Valve and Tube Supplies" [1], who are selling a tube made by KR Audio Electronics [2] in Prague, Czech Republic. The tube is a high-vacuum, bright-filament type that KR lists as its "R" triode. It has a British four-pin base with an offset pin for the plate, so you'll need to get the special socket that VTS offers if you want to construct your version of one of the earliest tube receivers ever made.

However, I have arranged with KR to make a limited number of these tubes with standard 4-pin bases, and will provide one, at my cost, to anyone wanting to build his own receiver. The price is \$100.00 postpaid.

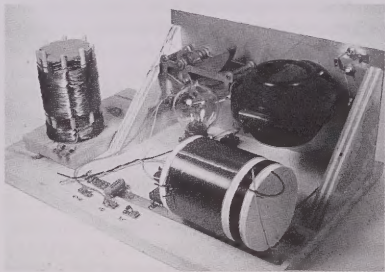
Rather than having the wiggly back-and-forth grid that DeForest specified for his first audions, this tube has the spiral-wound grid and concentric plate that we see in the tubular audions made first in 1916. I ran a set of curves on this tube (Figure 1), using 3.5 volts on the filament because I don't want to buy another one. KR says it wants 4 volts, but it works fine and will last longer my way! By graphical analysis, I think the amplification factor (μ) of this tube is about 15. In a real circuit, with a plate load of 100K, the practical gain would be about 7.

Here is where the breadboarding technique comes into its own! I wanted to build a finished version of the set, using period parts, after settling on values to suit this low-gain tube. Breadboarding helped me get through all the mistakes and blind alleys. With everything worked out in advance, the finished set could be as pretty as possible — no cracked corners and melted spots from sloppy soldering and parts value experiments.

My breadboard uses the standard grid-leak



The Type R Audion replica by KR as sold by The UK firm "Valve and Tube Supplies." VTS can also supply the required British 4-pin base.



Breadboard used as test bed to develop circuit for Audion receiver. All three experimental tank coils are on the board, including the variometer mounted on the front panel.

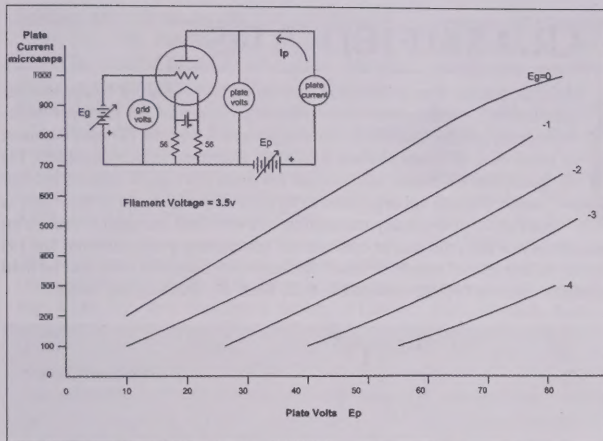


Fig. 1. Characteristic curves of the Type R Audion.

Wiegant circuit with only a few modifications. Mainly, there are Fahnestock clips everywhere so as to make component changes easy.

To review what I know about a radio like this: the first order of business is to make the tuning coil and match it to the capacitor on hand. If you want to tune the broadcast band, a tuning cap of 250 pF or more will be best. Any less will probably give you only partial coverage.

Then you think about the size of the tickler winding. My rule of thumb is to consider the gain of the tube — say it's 10 — and make the tickler turns 1/10 of the number of turns on the main winding. Using this "R" tube, with a gain of maybe 7, suggests a factor of 1/7 for the tickler. There's a tradeoff, too, between the size of the tickler winding and the capacitance needed at the regeneration capacitor; fewer turns at the tickler means you'll need a larger regen capacitor. You want the Q of the tuning tank to be high — no ferrite coil cores, no fine wire for the winding, and a good quality capacitor. And maybe one could tweak the grid leak for best performance.

I wound my tuning coil over a framework of eight dowels, thinking that turns could be

easily added or subtracted with such an arrangement. I paired up the coil with an old-time 250 pF tuning capacitor and used a signal generator to drive the resulting tank circuit, checking the end points of the tuning range while adding turns. After all the tweaking, the main winding has 70 turns, and the tickler has 15 turns.

To check the layout before risking the KR tube, I substituted a '30 triode to test for operation. I ran in power from bench

supplies and started with a set of 'phones, just like the old days. The set came to life and, that done, I switched to the repro tube. Things were much the same, so I tinkered with grid leak values and methods of antenna coupling, trying to optimize the circuit.

Tired of wearing the 'phones, I coupled the receiver output to an outboard tube amplifier through an orange drop capacitor as shown in the schematic. Selectivity improved as antenna coupling got looser, just as with any of these simple radios. I tried another tuning coil with more turns on the tickler and found the regen capacitor now needed to be only 200 pF, about half the capacitance needed with the original tank. Then I tried an old variometer, with the fixed

(continued on page 70)

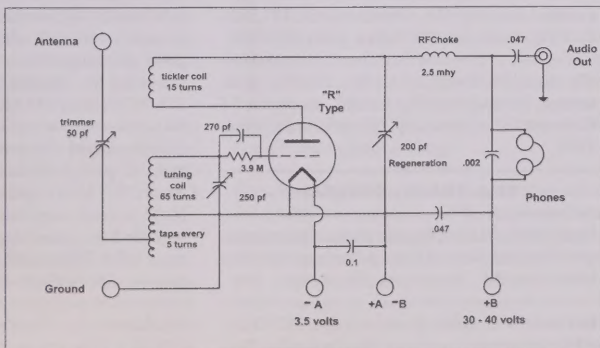
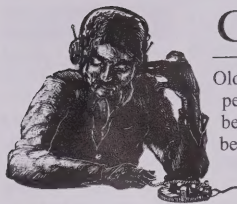


Fig. 2. Final schematic of breadboard circuit.



CLASSIFIED ADS

Old-time ads are free to members collecting and restoring equipment for personal use. Please observe the following: (1) one ad per issue per member; (2) include as SASE if acknowledgement is desired; (3) material must be more than 25 years old and related to electronic communications; (4) give your full name, address and zip code; (5) repeats require another notice (we are not organized to repeat automatically); (6) the AWA is not responsible for any transaction; (7) we retain the right to reduce an ad's size if over seven lines; (8) AWA does not accept commercial advertising in this column; and (9) closing date is six weeks prior to first day of month of issue. Ads received after that time will be held for the following issue. Mail all ads to: **RICHARD RANSLEY, P.O. BOX 41, SODUS, NY 14551.**

IMPORTANT!

OTB classified ads are now available for browsing in the "OTB On Line Edition" on our internet web site (www.antiquewireless.org). This practice will give members dramatically increased exposure for their ads.

SELL/TRADE—COMMUNICATIONS GEAR

National NC-173 with original speaker and manual, \$140. or trade for Crosley ACE 3-B. Ernie Nagy, 1012 S. Collier Blvd., #112, Marco Island, FL 34145 (239) 389-9101 E-mail: elnagy1599@webtv.net

Bendix 2 way transmitter/receiver radio base station, Model 1D650P, 115VAC, with mike, \$150. plus UPS; Two Motorola Twin V Model T43GGV 1131A, 6 or 12 volt DC, trans/recvr, control cables, etc. included, \$150. each or \$350. for all three units. Phil Guinan, 106 Page Rd., Litchfield, NH 03052 (603) 889-6213 E-mail: philip1924@aol.com

Gonset AR1 VHF transceiver with 12 volt dynamotor, working, \$25. Robert Martin, 111 Bancroft Dr., Rochester, NY 14616 (585) 663-4182

My excellent condition Collins KWM2, with manual, for your excellent Catalin. A. Bruno, 24 Butternut Drive, New City, NY 10956 (845) 354-8899

SELL/TRADE—GENERAL

Radio tubes, free list, bargain prices. Galena crystal radios and parts. Leonard Gardner, 458 Two Mile Creek Rd., Tonawanda, NY 14150

DeForest D-12 panel, good condition, \$75. OBO; ARC-5 transmitter, wire recorder, best offer. Paul Recupero, 265 Union St., Portsmouth, RI 02871

RCA 14X, \$45.; RCA 66X2 brown bakelite, \$45.; RCA 8-EY-31 45 player, \$55.; Sony R-R TC-352D, mikes, \$75.; Knight Console 65B-136-K, battery, \$75. (no shipping). All others, add shipping. Want Zenith band selector knob for T.O. Royal D7000Y. Robert Rossi, 10936 Melbourne St., Allen Park, MI 48101

Rare Vibroplex "Blue Racer" key (ca. WWI), \$275. Also, set of Collins Radio crystals and crystal mounts, (1937), rare, \$195.; Hammarlund Comet Pro, nice working condition, with crystal filter, \$395. Dave Crocker, 35 Santuit Pond Rd., #4B, Mashpee, Cape Cod, MA 02649 E-mail: radio-1@attbi.com

Walkie-Talkies, PRC-6 in good working order with adapters to allow the use of currently available batteries and instruction sheets, \$110. per pair or trade for Bunnell telegraph key and sounder in good working order. V.R. Vincent, 607 S. Delaware St., Conrad, MT 59425-2510 (406) 278-7039 after 1 PM MST

Cadre transistor CB transceiver, 1961, works, with mic, AC cord, 4 sets of crystals. US made in Endicott, NY, \$20.; Apeldo tube CB, 1960s and an M-82 antenna amplifier by Antenna Specialists, both for \$15., plus shipping; pair of globe #50's, make offer. John Kaetz, 6841 Chesser Rd., Bessemer, AL 35023 (205) 491-2933

AK Model 33, \$75.; Zenith AM Model 6D628, \$40.; Truetone AM Model D2611, \$25.; Emerson Stereo AM/FM w/separate 2nd speaker, wood

cabinets, \$40.; GE Model 408, \$25.; GE Model T-230C, \$25.; GE AM/FM clock Model C4510D, \$20.; GE AM/FM Model T-210A, \$20. All the above in good working condition. Zenith Trans-Oceanic Model Y600/L, \$45.; DX-300 w/manual, \$25.; Philco Model 211, \$20. Last three items not working. Waterman 3" scope, Model S11A, \$35.; Weston Industrial Tester, Model 785 w/HV adapter, manual, \$50. Clarence Bauer, KV4BY-E, 1707 Guldahl Dr., Titusville, FL 32780

JBL Signature Series monaural speaker system (from 1959) with a #175 DHL driver horn assembly, #130 15" low frequency driver, N1200 crossover network in a 36" x 15 1/2" x 25 1/2" mahogany cabinet, plus a Sherwood S-2000 AM/FM monaural tuner & S-1000-11 36 watt monaural amplifier. Rich Hi-Fi sound with deep bass. Speaker in excellent condition. Sherwood Tuner & Amplifier both work but need reconditioning & some repair. \$450. Pickup only. Photo available. Robert Eckert, 133 East 7th Street, Clifton, NJ 07011-1104 (973) 340-0579

SELL/TRADE—LITERATURE

Signed copies of my tube book "Illustrated History of the Philips Radio Valve to 1935", \$10 including postage (to avoid Australian bank fees, I would prefer payment by cash, if possible). Also have several odd light bulbs including American, British and European dating from the 1920s to 1945 and will supply details and photographs to anyone interested. Fin Stewart, "Cockerdale" 380 Bulga Rd. S, Wingham N.S.W. 2429 Australia E-mail: cockerdale@bigpond.com

1928-43 European radio schematics, 1300 pg., \$100.; Telefunken 1932-38 radios calibration instructions, 90 pg., \$20. Also, reproduction copies of old tube books by Sylvania, Tungsram, Purotron, Tube Vade-Mecum. Argirios Adamidis, Panoramatos 38, Panorama, Thessaloniki, Greece 55236 E-mail: aadam@teithe.gr

Have the following QSTs for trade: June, July, Sept. and Oct. 1916. Need Feb. March, April and May 1916. Bill Hurni, 329 Evergreen Dr., North Wales, PA 19454 (215) 699-5787 E-mail: wmhurni@att.net

SELL/TRADE—PARTS

Film, Disc and Electrolytic capacitors for tube radios. Now available are axial leaded tubular film and E-caps in "hard to find" pre-WWII MFD/uF sizes. For price list and product info, contact Dave

Cantelon, 42 Clematis Rd., North York, Ontario, Canada, M2J 4X2 (416) 502-9128 E-mail: justradios@yahoo.com Website: www.justradios.com

Panel meter, Westinghouse, Type KX2415, Style YK-44550-1, self contained, DC volts 0-100, Radium dial and pointer, FSN6625-684-5329, 4 1/2 inches square. Very precision meter. Good working condition, \$150. or best offer. Paul Recupero, 265 Union St., Portsmouth, RI 02871-2264 (401) 847-8589

Tube sockets, military ceramic type, 4 to 8 pin NOS, \$3. each. Also 7 and 9 pin mini types, some with shielded base, .25 each; Robert Martin, 111 Bancroft Dr., Rochester, NY 14616 (585) 663-4182

SELL/TRADE—TRANSISTOR RADIOS

Hybrid portable radios: Braun, 1957, plastic gray, works, \$150.; Philips, 1956, plastic cream, red knobs, works, \$130.; Grundig, 1957, plastic cream/black, not working, \$120. Also, a Conion Japanese transistor, model CR-30, excellent in the original box with instructions leaflet, \$130. Argirios Adamidis, Panoramatos 38, Panorama, Thessaloniki, Greece 55236 E-mail: aadam@acc.teithe.gr

SELL/TRADE—TUBES & TRANSISTORS

Four deForest ceramic based tubes; two DL-2 and two DL-5 untested but with good filaments, \$40. each or trade for Crosley ACE 3-B. Ernie Nagy, 1012 S. Collier Blvd., #112, Marco Island, FL 34145 (239) 389-9101 E-mail: elnagy1599@webtv.net

Telefunken 6151W "Atlanta", late 1950s, bakelite, \$100.; Telefunken 1361W "Jubilant", late 1950s, wooden cabinet, \$100.; Murphy TA152, bakelite, 1950s, \$70.; Tesla 402V, 1940s, bakelite, \$100.; MetzS155, 1950s, portable radio/phonograph, \$60. Argirios Adamidis, Panoramatos 38, Panorama, Thessaloniki, Greece 55236 E-mail: aadam@acc.teithe.gr

Six sub-miniature Raytheon vacuum tubes and an RCA P/N 955 Acom tube. Of the Raytheon items, three are marked with P/N JRP/5702/WA and were not previously used as seen by the full-length and clean condition of leads. Other Raytheon items had been used and consist of one P/N CK/5702/WA and two P/N CK/5744/WAs. Items offered as is (the 955 has been checked for, and has filament continuity). \$7.50 plus postage for all.

Anthony D. Rita, 98 Chimney Sweep Hill Rd., Glastonbury, CT 06033 E-mail: tonyrita1@aol.com

WANTED—GENERAL

Marantz first power amplifier, uses EL39 tubes. Condition unimportant. Or pay well for photo of same. For use in upcoming "History of Audio" book. Charles Graham, 4 Fieldwood Drive, Bedford Hills, NY 10507 (914) 666-4523

Instructions & other "paper" for Canadian version of Westinghouse RC battery set. Also need Canadian Westinghouse WD-25 or WR-25 tubes. Tod Prowell, 413 North York Road, Mechanicsburg, PA 17055-6016 (717) 697-5227 E-mail: aeriola@adelphia.net

Nine or ten tube receiver from the late 1920s using Rusco Band-Pass Filter and Camfield parts. Restorable. Also, any literature on 1920s Superhets. Thank you! Richard Ammon, 316 West fourth Avenue, Cheyenne, WY 82001, (800) 473-2387 (toll free) or E-mail: wireless@superhets.info

Transistor radios, 4 1/4 in. (12cm) or smaller, circa 1950s, 1960s, made in Japan or USA. No cracks. Also telegraph keys by Bunnell, marked "Patented Feb. 15, 1881". Ron House, VE3HNV, P.O. Box 2802, Buffalo, NY 14240 E-mail: ronrh@hotmail.com

WANTED—KEY & TELEGRAPH

Unusual telegraph items such as large spark keys, pre-1870 landline keys, oddball bugs such as right angle, vertical, motorized, dual pendulum, mag-

netic operations, etc. Gil Schlehman, 335 Indianapolis, Downers Grove, IL 60515 (630) 968-2320

WANTED—PARTS

Coil set "C" (3.5 mHz to 7.3 MHz) for National HRO 60 receiver. Also need calibrator XCU50-2 and 15 meter coil. Gerald Park, W8QS, 1022 Cressenwood Road, East Lansing, MI (517) 351-5106 E-mail: park@msu.edu

Etched nameplate (or pencil rubbing) for Majestic Melody Cruiser; Bandsread escutcheon for Hallcrafters SX-28. Alan Dadisman, 1787 Panettah Drive, Alpine, CA 91901 (619) 445-3254 E-mail: aldad@cox.net

Metal band surrounding the joint between the horn and neck of a Music Master horn speaker. Also chassis for a Lyric Model S-6 radio, non-working OK. James S. Fisher, RR1, Box 861, Port Royal, PA 17082 (717) 527-2224 E-mail: yrless@tri-county.net

An "S" meter for an HRO Model 581. Will pay your price. James Fred, 5355 S. 275W, Cutler, IN 46920 (765) 268-2214

WANTED—BC/SW TUBE RADIOS

Crosley ACE 3-B. Ernie Nagy, 1012 S. Collier, #112, Marco Island, FL 34145 (239) 389-9101 E-mail: elnagy1599@webtv.net

Belmont Boulevard pocket radio. William Van Lennep, P.O. Box 211, Pepperell, MA 01463 (978) 433-6031 

BREADBOARDING, *continued from page 67*

coil as the tank and the movable coil as the shunt fed tickler.

All these coils worked, but my second one was the best. Trying different values for the grid leak left me with 270 pF and 3.9 megs as the best values. You can see the three tank coils in the picture of the breadboard. Final schematic of the breadboard circuit is shown as Figure 2.

When I wind the coil for the final set I'll use a cardboard coil form about 2 inches in diameter. There'll be maybe 30 tickler turns. The main winding will have several taps at the cold end, and that will allow a choice of where to connect ground — bringing the tuning range where it wants to be and allowing for a choice of antenna

coupling taps. 

REFERENCES

- [1] Valve and Tube Supplies Web site: <http://www.valves.uk.com>
- [2] KR Audio Website: <http://www.kraudio.com/home.htm>

Special Note: I have got to make more room in my shops for future work, so I'm going to dispose of some of the breadboards described in this column. I will entertain offers from the AWA membership before the whole shebang goes on Ebay! Reach me by email at dparks@erols.com.

BUSINESS CARD ADS

Are you offering a product or service of interest to antique radio enthusiasts? Would you like to let the world know about the tubes, sets or paper you'd like to acquire? Place a business card in this space for the low price of \$15.00 and it will be seen by over 4,000 hard core devotees of our hobby. Purchase a year's worth of insertions (four issues) for \$50.00 and save \$10.00 over the individual ad pricing.

Send us a copy of your business card, or a special typeset ad designed to fit our standard space. We can, alternatively, typeset a short message for you (no more than eight lines, 50 characters max per line, please). For the time being, there will be no charge for typesetting. All ads must be for radio-related items or services and must be paid in advance. Send your ads and checks (payable to AWA) to Robert W. Perry, "Smoke Signals," 131 E. High St., Painted Post, NY 14870. Closing date is six weeks prior to first day of month of issue. All advertising income is used to further the conservation work of the AWA Electronic Communication Museum.



<http://www.radioswapmeet.com>

Antique and Vintage
Electronics Market

Come Join the Fun!

Browse the Tables
or Buy a Table
Listings are always FREE!!!

SUPER HET SCHEMATICS

1920 to 1930

Schematics • Layouts • Construction Info • Ads

200 + Brands & Models — Another 200 + Where Available

From the soon to be published "The Rolls Royce of Reception,
An Encyclopedia for Super Heterodyne Collectors"

Rick Ammon Toll Free: 888/ 473-2387

www.SuperHets.info

ANTIQUE TUBES WANTED

We buy and sell Collector and
Pre-Octal Tubes

See www.fathauer.com for listing or
for catalog e-mail tubes@qwest.net or call

George H. Fathauer & Assoc., LLC

688 W. First St., Ste. 4, Tempe, AZ 85281

Phone: 480.968.7686

Fax: 480.921.9957



Just
Radios



Capacitors & Schematics for Tube Radios

David and Babylyn Cantelon
42 Clematis Rd., North York
Ontario, Canada M2J 4X2

www.justradios.com
justradios@yahoo.com
(416) 502-9128

Bob's Antique Radios

Buy-Sell-Trade

Quality Capacitors and
Electrolytics at fair prices

For more Information visit
Radioantiques.com or Email
radiobob1@aol.com

**RADIO
DAZE**

MAIN OFFICES & RETAIL STORE
7 Assembly Drive, Mendon, NY 14506
Tel: 716-624-9755 Fax: 716-624-7857
Our Website: www.radiodaze.com

VINTAGE RADIO & ELECTRONICS



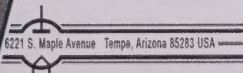
Sales - Service
Components - Supplies
Information - Literature
email: info@radiodaze.com



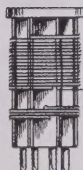
Radio Daze, LLC - A Limited Liability Company



ANTIQUE
ELECTRONIC
SUPPLY



Phone 480.820.5411
Fax 480.820.4643 or 800.706.6789
www.tubesandmore.com
info@tubesandmore.com



Highest quality how-to books!

Brand new & reprints of classics.
Early radio, electronics, electricity,
machines, science & tech! Projects,
plans, nuts & bolts. Big Catalog!
<http://www.lindsaybks.com>

Lindsay Publications

PO Box 538 Bradley IL 60915

Organize Your Antiques & Collectibles

Antique Tracker™

Antique and Collectible Inventory Software

<http://www.antiquetracker.com>

WEBTUBES.COM

Antique & Collectible Vacuum Tubes 1909-1940
Vintage Radio/Electronic Books & Literature

203-226-0700

tubes@webtubes.com

Wanted Grebe

Hard to Find CR Series Radios and R Series Amplifiers.

Original Instruction Manuals and Other Literature

Steve Wallace
3707 Pricetown Rd.
Fleetwood, PA 19522

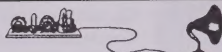
(610) 944-7230
kkks@epix.net

RADIO BOOKS WANTED

Always buying: Books, Magazines and Manuals.
Single items or collections. A huge selection of books on radio
and related technology in our shop and catalogs. Call or
visit our web site: www.beqbooks.com

BEQUAERT OLD BOOKS
P.O. BOX 775, FITZWILLIAM NH 03447

Toll Free (888)-447-5037 info@beqbooks.com



ESTES AUCTIONS

Specializing in Vintage Radios
& Radio Appraisal Service
www.estesauctions.com

7404 Ryan Road
Medina, Ohio 44256

Phone: (330) 769-4992
Fax: (330) 769-4116

E-mail: estes.auctions@aol.com

Free Estimates
Hrs. - 9 AM - 5 PM EST
Tues. - Sat.

Tel/Fax (860) 928-2628
E-mail: bob@oldradiodoc.com
www.oldradiodoc.com



ANTIQUE RADIO RESTORATION & REPAIR

1920 - 1960's

Buy & Sell

Reasonable Rates, Tubes, Professional
Overhauls, Cabinet Refinishing. Service
For All Antique Car, Table & Console
Radios, Communication Receivers &
Tube Amplifiers.

BOB ESLINGER

20 Gary School Road
Pomfret Center, CT 06259

ARBE-III

Universal Battery Eliminator
\$149.95 + S/H

Antique Radios Inc, PO Box 6352
Jackson, Michigan 49204

Web: www.arbeiii.com

Email: arbeiii@yahoo.com

Phone (517) 787-2985 Evenings

KEEP HISTORY ALIVE!

Preserve your photographs for years to come.

- Repair damage
- Restore detail
- Eliminate flaws
- Rearrange elements
- Enlarge/reduce
- Digitize

CALL FOR DETAILS

 **CGS Images 866 CGS IMAGES**



Modern Radio Laboratories

Since 1932

Crystal Set and One Tube Radio Instructions. Exclusive source,
printing and publishing of all MRL Handbooks & literature by
Elmer G. Osterhoudt. Tested instructions and plans.

Catalog \$2.00 ppd.

MODERN RADIO LABS
P.O. Box 14902-A
Minneapolis, MN 55414-0902

Radio Activity

Old radios repaired and purchased

Wanted Zenith consoles

Repairs guaranteed

Jim Berg (509) 732-4047

4261 Wilcox Rd. Box A Northport, WA 99157

jimfberg@webtv.net

<http://homepage.plix.com/Radioactivity>

SILENT KEYS

We record the passing of the following AWA members with deep regret.

DONALD C. "DONNIE" BECKER, JR., K2RAB, 71, (11-28-02) worked in the Audio/Visual Department of the State University of New York-Albany from 1967 until he retired in 1994. He was a member of the Schoharie County Amateur Radio Association.

DONALD B. BICE, W4PCO, 78, (2-5-03) performed communications work for the St. Petersburg Police Department for five years. Bice was a member of the Pelican Chapter, QCWA and the Morse Telegraph Club of St. Petersburg.

D. H. MCDONALD, Auckland, New Zealand.

EARLE M. SILGER, N5HZW, Mobile, AL.

Note: AWA officers and members are being asked to submit all information about Silent Keys to Joyce Peckham, Box E, Breesport, NY 14816. This will help in the collection and coordination of information and appropriate recognition of both AWA members and others who have made contributions to the electronics and entertainment industries.

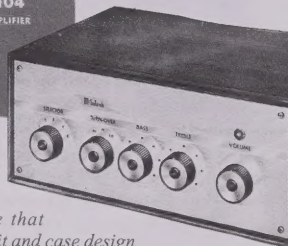
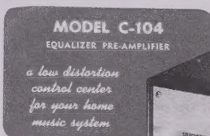
RESTORING A PREAMP FROM THE GOLDEN AGE OF HI-FI

The golden age of high fidelity in the United States might be said to have begun when Frank H. McIntosh and Gordon J. Gow developed an innovative 50-watt power amplifier. This was the era of component hi-fi. The power amplifier, connected to a massive speaker in the living room or study, was usually out of sight in the equipment cabinet; the user accessed the system through such components as an am/fm tuner, record player, and tape deck, which were installed at convenient locations in the cabinet.

But the nerve center of any self-respecting component system was the preamplifier. This unit not only provided the initial amplification for the low-level audio sources to be connected to the power amplifier, it also provided the proper equalization for magnetic phonograph cartridges, tone and volume controls, a master on-off switch, and appropriate switching circuits. All of the audio sources to be used with the main amplifier were connected to convenient jacks on the preamplifier, where they could be selected at the turn of a switch.

Collecting vintage high-end high-fidelity gear can be a rewarding byway to pursue for those in the antique radio hobby. And certainly the McIntosh products are among the most desirable to collect.

I recently spotted a McIntosh C-104 preamplifier in an antique shop and, after a bit of discussion about the price, was able to make it mine. The C-104 was not in bad shape for a fifty-year-old device. Housed in the optional mahogany cabinet, the unit accepted outputs from TV audio,



Front panel of C-104 from McIntosh sales brochure. Note that height of this unit and case design seems a little different from author's equipment as shown in the other pictures. His may be a later variation.

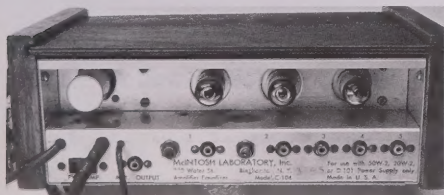
am/fm tuner, low-level microphone, and high- and low-level magnetic cartridge. Any of these sources could be selected by manipulating a five-position switch on the panel.

According to the published specifications, the C-104 delivered 4 volts output at less than 0.3% distortion from 20 - 20,000 cps. The tone controls offered bass accentuation or attenuation of 20 dB; treble accentuation of 15 dB; treble attenuation of 20 dB.

With the C-104 on my test bench, I checked resistors, capacitors and other components, replacing any that were defective. A new American type power cord was installed. One of the unit's three 12AX7 (also known as ECC-83) twin triodes was missing. I decided to remove the two surviving ones and install a new, tested set of three Brimar 12AX7s from my own inventory.

All electro-mechanical parts, including the selector switch, volume and tone controls, tube sockets and input connectors were treated with contact cleaner (Deoxit DP5 by Craig Laboratories). Tube-socket contact tension was restored by applying pressure with a dentist's pick.

The front panel was cleaned with a lint-free cloth wet with a mild detergent solution, taking special care not to damage the lettering or the lacquer finish. The Bakelite
(continued on page 75)



Rear apron showing tubes, input and output jacks, and AC outlet. Silk-screened lettering has suffered a bit due to age.

AUTHOR'S ADDRESS: P.O. BOX 25, OSASCO, SP, BRASIL 06016-970

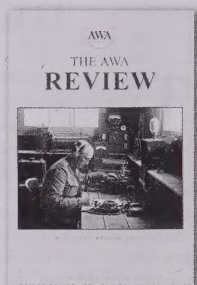
NOW AVAILABLE FROM THE AWA MUSEUM STORE

All profits are used to support the Museum • See back cover for order blank

AWA REVIEW VOLUME 15

The AWA Review acts as a showcase for some of the excellent research done by AWA members. This volume represents an attempt to link the articles in the Review more closely with the papers and exhibits at the annual AWA Conference in Rochester, NY. Three of the four articles are based on papers or exhibits at past conferences. The fourth article, although not based on a conference presentation, is particularly timely since it reports on the Marconi Wireless Apparatus on the Titanic as revealed and confirmed by the latest photographs of the radio rooms on the wreck.

The articles cover (1) the role that wireless interception has played intelligence gathering from the first days of wireless communication to the present (by Bart Lee), (2) the exact configuration of the Marconi wireless apparatus as confirmed by recent underwater photographs (by Parks Stephenson), (3) the Radio and Seed Business of Henry Field and a discussion of other early broadcasters who were both radio pioneers and radio entrepreneurs (by George A. Freeman), (4) the history of the Rogers Radio Company and their early AC Tubes (by Maurice Chaplin). A "Cumulative Table of Contents" included at the end of this volume lists the title of every article in every volume of *The AWA Review* since it began publication in 1986. *Price: \$24.95 US postpaid in US and Canada; elsewhere, add \$5.00.*



THE OTB ON CD ROM

These discs run on any PC or Mac system capable of running Acrobat 4.0 (free copy included). PCs should have 486 or better processor, 10 Mb of free hard disc space, MS Windows 95 or 98 or NT 4.0 with service pack 3 or later.

Volume 1 (Contains all issues from January, 1960 - March, 1985) *Price: \$49.95 US, postpaid in U.S. and Canada; elsewhere, add \$5.00*

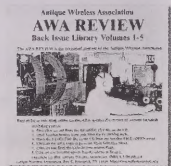
Volume 2 (Contains all issues from June, 1985 - November, 1996) *Price: \$49.95 US, postpaid in U.S. and Canada; elsewhere, add \$5.00*

Volumes 1 and 2 ordered together *Price: \$89.95 US, postpaid in U.S. and Canada; elsewhere, add \$5.00*



NEW!!! AWA REVIEWS ON CD ROM

Now you can acquire these scarce out-of-print volumes for your library. Operating requirements same as for OTB CDs above. Volumes 1-5 and Volumes 6-10 available on two separate CDs. Price for either CD, \$19.95 US; both, \$35.00, postpaid in US and Canada. Elsewhere, add \$3.00 per CD.



INDEX OF AWA PUBLICATIONS

Master index of *The OTB*, *The AWA Review*, and other AWA documents through March,

2000. Available on either paper or 3.5-inch floppy disk (specify when ordering). Text format, searchable with your word processor.

Price: \$9.00 US, postpaid in US and Canada for either version (please specify). Elsewhere, add \$1.00.; \$2.00 discount with any purchase of \$19.00 or more (see back cover). NOTE: This index is included on the *AWA Review* CD ROM and both of the *OTB* CD ROMs.

HANDSOME AWA PIN

Replaces the far-too-expensive hand-made gold pins of yesteryear. The new pin maintains the stylized AWA logo surrounded by a Hertz loop, but adds the words "Antique Wireless Association" wrapped around the loop in bright gold. Background is dark blue cloisonné and the pin is clutch mounted. 1" in diameter. Price: \$6.00 US and Canada, elsewhere, add \$1.00.



AWA COFFEE MUG

Heavy porcelain mug in cobalt blue with yellow-gold AWA lettering and logo. good for daily use and dishwasher safe. \$9.75 postpaid in US and Canada.



**Make checks out to "AWA Museum" and send to Ed Gable, Curator,
AWA Museum, 187 Lighthouse Rd., Hilton, NY 14468.**

RESTORING A PREAMP, continued from page 73

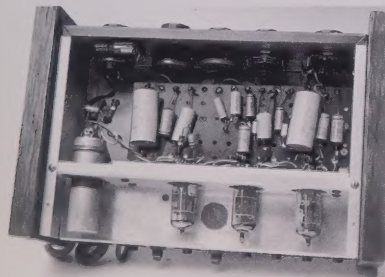
knobs were washed the same way and later treated with plastic polish.

To test the C-104, I connected it to a vintage monophonic sound system consisting of a McIntosh MC-30 power amplifier, University Model 6201 dual-range coaxial loudspeaker, and a Brazilian-made Telefunken FM tuner. I had to be careful with the MC-30 connections because the

MC-30 is a later amplifier than the ones for which the C-104 was designed.

Power was supplied to all units gradually through a Variac, and only a couple of small problems turned up: a burned-out dial lamp on the C-104 and a still-noisy volume control potentiometer that required a second cleaning. Hum and gain levels were adjusted in accordance with original instruction books from the author's library. The system performed well with plenty of headroom, airy high-frequency response and an honest bass.

Having been a radio collector for many years, I still find it a constant pleasure to be able to research and restore fine equipment such as this so that it performs as it did when new. ☐



Under-chassis view showing circuit board with main components. Pre-tested capacitors and resistors, similar to originals, were used to replace defective units.

REFERENCES

Carlos Alberto Fazano, "A Brief History of the Valve Audio Amplifier," *AWA Review*, Volume 7, 1992, pages 91-106.

Carlos Alberto Fazano, "Hints to Start Your Living Collection," *Radio Bygones* (England) 52, 1998, page 12.

MUSEUM STORE ORDER FORM

OTB BACK ISSUES Priced at \$3.00 each postpaid. 20% discount for orders of 6 or more issues; 30% discount for orders of 12 or more. AWA review issues do not count towards the discount.

QTY	ISSUE	QTY	ISSUE	QTY	ISSUE	QTY	ISSUE
_____	25-4	_____	29-2	_____	32-2	_____	36-1
_____	26-1	_____	29-3	_____	32-4	_____	36-2
_____	26-2	_____	29-4	_____	33-2	_____	36-3
_____	26-3	_____	30-1	_____	33-4	_____	36-4
_____	26-4	_____	30-3	_____	34-1	_____	37-1
_____	27-1	_____	30-4	_____	34-3	_____	37-2
_____	28-1	_____	31-1	_____	34-4	_____	37-3
_____	28-2	_____	31-2	_____	35-1	_____	37-4
_____	28-3	_____	31-3	_____	35-2	_____	38-2
_____	28-4	_____	31-4	_____	35-3	_____	38-3
_____	29-1	_____	32-1	_____	35-4	_____	38-4

Volumes 39-Current — All Issues Available

INDEX OF AWA PUBLICATIONS \$2.00 discount with purchases of other items totaling \$19.00 or more.

QTY	VERSION	QTY	VERSION
_____	3.5-inch floppy @ \$9.00	_____	hard copy (paper) @ \$9.00

AWA REVIEW BACK ISSUES Priced as indicated. No quantity discount.

QTY	ISSUE	QTY	ISSUE	QTY	ISSUE
_____	Volume 6 \$6.00	_____	Volume 9 \$13.00	_____	Volume 14 \$27.50
_____	Volume 7 \$6.00	_____	Volume 10 \$13.00	_____	Volume 15 \$24.95
_____	Volume 8 \$6.00	_____	Volume 13 \$16.95		

CD ROM DISKS Priced as Indicated.

OTB BACK ISSUE CDS

QTY	DISC	QTY	DISC	QTY	DISCS
_____	Vol. 1 (issues 1-1 thru 25-4) @ \$49.95	_____	Vol. 2 (issues 26-1 thru 37-4) @ \$49.95	_____	Set: Vol. 1 and Vol. 2 @ \$89.95

AWA REVIEW BACK ISSUE CD

QTY	DISC	QTY	DISC
_____	AWA Review Vols. 1 thru 5 @ \$19.95	_____	AWA Review Vols. 6 thru 10 @ \$19.95
_____	Set of both CDs @ \$35.00		

AWA MEMBERSHIP PIN

QTY	
_____	Pin @ \$6.00

AWA COFFEE MUG

QTY	
_____	@ \$9.75

ORDER TOTAL CALCULATION Note: Foreign postage surcharge does not apply to Canada.

_____	OTB Back Issues @ \$3.00 = \$ _____	
_____	Subtract \$ _____ Discount (if any) / Add \$3.00 foreign postage if applicable.	Total OTB Order \$ _____
_____	Indexes (paper or disk) @ \$7.00 = \$ _____	
_____	Subtract \$2.00 discount if applicable / Add \$1.00 foreign postage if applicable.	Total Index Order \$ _____
_____	Total AWA Review Cost = \$ _____	
_____	Add \$5.00 per volume foreign postage if applicable.	Total Review Order \$ _____
_____	Individual OTB Back Issue CDs @ \$49.95 = \$ _____	
_____	Add _____ Vol 1 + Vol 2 sets @ \$89.95 = \$ _____	
_____	Add \$5.00 foreign postage if applicable.	Total OTB CD Order \$ _____
_____	AWA Review CDs @ \$19.95 each or \$35.00 for both = \$ _____	
_____	Add \$3.00 foreign postage per disk if applicable.	Total AWA Review CD Order \$ _____
_____	AWA Membership Pin @ \$6.00 = \$ _____	
_____	Add \$1.00 foreign postage if applicable.	Total Membership Pin Order \$ _____
_____	AWA Coffee Mug @ \$9.75 = \$ _____	
_____	Add \$1.00 foreign postage if applicable.	Total Coffee Mug Order \$ _____
	Grand total of individual total amounts = \$ _____	

Please make your check payable to AWA Museum and send to:
Edward M. Gable, 187 Lighthouse Rd., Hilton, NY 14468.

Name _____ Address _____